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Seva Sadan College of Arts, Science & Commerce

**Affiliated to University of Mumbai & Approved by
AICTE**



Research & Development Cell & Institution's Innovation Council (IIC) Organizes

9th International Multidisciplinary Conference (Hybrid Mode) On

**"Innovations in e-Commerce, Financial Services,
Education and Artificial Intelligence"**

**14th February, 2026
Saturday**

**Seva Sadan College of Arts, Science & Commerce
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Ulhasnagar, Dist. Thane, Maharashtra, India PIN 421003

Schedule of Conference (Hybrid Mode)

Timing	Particulars
09.15am – 10.00 am	Welcome at Registration Desk & Tea
10.00am – 10.10 am	Welcome Address by Conference Co-Convener & Member Asst.Prof Sona Dawra, Asst Prof. Paree Ahuja & Asst Prof. Dipika Satnathi
10.10am – 10.15 am	Lamp Lighting
10.15am – 10.25 am	Introduction of Conference by Convener & Principal Dr Gulabchand K Gupta
10.25am – 10.35 am	Address by Guest of Honor Dr Vivekkumar V Patil, Principal, Royal College of Science & Commerce, Dombivli, Dist Thane
10.35am – 10.55 am	Address by Guest of Honor & Keynote Speaker-1 Dr Rajendra K Jain, Group Director, Vikrant Groups of Institutes, Indore, Madhya Pradesh.
10.55am – 11.15 am	Address by Guest of Honor & Keynote Speaker-2 Dr Ameya Kumar Tripathy, Professor & Director of the Centre GeoAI at Don Bosco Institute of Technology, Mumbai.
11.15am – 11.35 am	Address by Chief Guest Dr Keyurkumar M Nayak, Director, GICED, University of Mumbai, Mumbai
11.35am – 11.45 am	Release of Conference Abstract Book
11.45am – 11.50 am	Introduction of Session Chairperson Dr Sharmila Rathod, Associate Professor, Rajiv Gandhi Institute of Technology, Mumbai
11.50am - 01.00 pm	Paper Presentation Track 1: Paper No from 1 to 15
01.00pm - 02.00 pm	Lunch Break
02.00pm - 02.10 pm	Introduction of Session Chairperson Dr Natika Poddar, Associate Professor, St. Francis Institute of Management and Research, Mumbai
02.10pm - 03.45 pm	Paper Presentation Track 2: Paper No from 16 to 25
03.45pm - 04.00 pm	Tea Break
04.00pm - 05.00 pm	Paper Presentation Track 3: Paper No from 26 onwards
05.00pm - 05.15 pm	Valedictory
05.15pm - 05.25 pm	e-Certificate Distribution
05.25pm - 05.30 pm	Vote of Thanks

Join Zoom Meeting

<https://us05web.zoom.us/join/tmHGqRboQ6WHnLC5QT6ahg>

Meeting ID: 894 0054 8692

Passcode: 205565

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A STUDY ON RECENT TRENDS AND ITS APPLICATIONS IN CRM

Ms. Anisha Madhwani

Assistant Professor, Seva Sadan College of Arts, Science and Commerce

ABSTRACT

In today's business outlook, customer relationship management CRM plays a very crucial role in maintaining customer retention and loyalty. with rapid advancements in digital technology CRM has evolved into a dynamic and highly personalized system. Business uses digital platforms social media and mobile apps to connect with customers anytime and anywhere. in this paper. We will explore the recent trends and applications which are used in CRM and what are the impact of CRM in business and industry world.

Keywords: ECRM - Measuring CRM performance -software app for customer service - CRM service industries in India

INTRODUCTION

ECRM – Electronic customer relationship management refers to the use of digital technologies and the internet to manage customer relationships. CRM is no longer just about managing and powered by internal and digital tools and in database. CRM extends traditional in the online world using websites emails delivering faster smarter and more sufficient service.

Traits of ECRM –

1. 24/7 Availability - customer can access the services anytime as there are no business hours.
2. Integration- Customers can connects with e-commerce, email, directly from websites and social media platform.
3. Motorization - daily task are done automatically example sending invoice follow up mails, etc.
4. Do – it – yourself (DIY): tracking portal chat board etc. reduced dependency on staff

Example: i) When you book an express train ticket on IRCTC website, receive a digital e-ticket, get SMS updates and chat with a support agent online - all of this is e-CRM in action.

ii) Zomato also uses e- CRM to send the order confirmation notifications, tracking order notifications, giving offers, allow customers to re-order with one click.

Measuring CRM performance: how to know if CRM is working?

Only implementing a CRM system is not enough, but businesses must measure its performance to ensure it's delivering value. Without measurement, you can't improve. Measuring the CRM performance means tracking key measures that reflect the Customer Satisfaction, Customer Reviews, Financial returns, Long Term Relationship with customers and loyalty aspects.

Let's explore which software apps are used for customer aspects:

These tools are the backbone of modern CRM that enables any company to respond to queries instantly, empower the customer to help themselves and tracking every interaction in one place. There are many customers self service portal which gives faster resolution, customer feels free to empowerment and there will be 24/7 Availability even at midnight.

CRM also helps in service industries in India like banking sector, Insurance sector, Hospitality and Healthcare sector.

Example: In banking sector HDFC Bank has revolutionized its customer engagement by CRM to deliver hyper-personalized, proactive financial services based on customers life stages. It provides the net banking and uses a unified CRM platform that integrates data from various sources which includes core banking system, credit bureau reports (CIBIL), KYC /past application records for creating the comprehensive 360- degree view of each customer. This data – driven approach has come into faster and tangible results i.e. higher conversion rates, lower default rates, more loyal customer relationships and demonstrating how strategic CRM can transform a traditional banking experience into a dynamic personalized and trusted partnership.

Life Insurance Corporation of India (LIC), as India's major public sector insurer, oversees over 300 million policyholders and owns decades of customer data. Despite Legacy system, LIC has embraced modern CRM to nice customer retention and service delivery. The bank uses a single CRM platform to monitor the generations

and maturity of policyholder data. This digital transformation enables from initial registration to renewal, acted, multi-channel communication address are delivered via SMS, email, and physical post s before due date. A dedicated agent will follow up with a call after seven days if payment is not received. After that, the agent helps policyholders and senior clients make online payments using the LIC e-Service Portal, including doorstep renewals, filing claims, and documenting.

Max Healthcare: Using CRM to Transform Patient Care -One of the top private hospital groups in India, Max Healthcare serves more than 20 lakh patients a year and has more than 17 hospitals in North India. Max put in place a sophisticated CRM system powered by Salesforce Health Cloud that was integrated with teleconsultation platforms, billing systems, and electronic medical records (EMR) in order to efficiently manage this size and provide a flawless patient experience. From digital onboarding, when patients register online, upload their medical records, and create digital IDs, to post-treatment care, the system facilitates end-to-end patient journey management. No-shows are greatly decreased because patients can quickly reschedule, arrange appointments online, and receive automatic SMS reminders. Following treatment, the CRM initiates automated email and SMS follow-ups with health advice, prescription reminders, and check-up appointments.

Patient Experience & Engagement: By managing patient journeys from booking to feedback and providing features like digital health lockers and SMS reminders, the CRM system helps improve patient engagement.

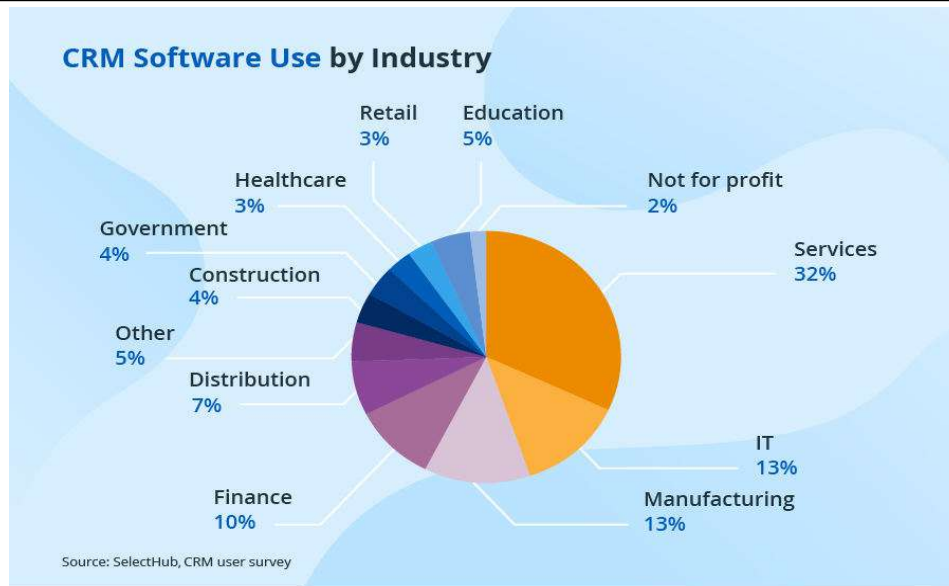
REVIEW OF LITERATURE

These experts from existing research paper highlights that recruiting new clients should be viewed only as an intermediate step in the marketing process building strong ties with these clients and converting them into devoted ones are equal components of marketing. In order to acquire, retain, and improve client connections in multisector firms, he suggested relationship marketing. Many financial services companies are racing to become more customer-focused. Customer relationship management software deployment is a crucial part of many undertakings. According to our research, the majority of institutions have a very limited perspective on CRM, which has resulted in few advantages. Despite the emergence of second-generation CRM, which now encompasses the entire organization, success has not yet spread widely. As a result, the author created a framework focused on integrating back-office/front-office integration, channel management, relationship management, and e-business operations into a customer-centric strategy. Customer relationships are not an external factor that began to have an impact on the company. It is an essential component of management and has recently taken on a crucial role in today's industry. CRM is the application of information technology to relationship marketing strategy, and it is a topic that is becoming more and more important in marketing. Overall, the literature review provides a comprehensive overview of the current state of CRM, highlighting its potential and strength in Industry.

RESEARCH METHODOLOGY

The research is designed on the basis of descriptive method to understand the growth of CRM. Since there is no survey or response technique, as it does not contain any primary data. The majority of the secondary sources used in this paper are online resources. The information acquired from various genuine sources are evaluated and reported in the study of market for CRM has undoubtedly grown. CRM started as a means for keeping customer information but has now become an end-to-end system that enables companies interact their customers. With over 4000 CRM systems in use worldwide, it holds the biggest market share in corporate software at 29%. The increase in demand for automated customer engagement, expanding the scope of digital operations, and integrating CRM systems into different organizational departments like sales, marketing, and customer services to enhance the customer experience and generate profits are the main factors that have led to advancements in the CRM market globally.

A cyclical, five-stage process (Reach, Acquire, Convert, Retain, Loyalty) that increases profitability by 25% with only 5% higher retention is used to illustrate the growth of CRM. The adoption of mobile devices is expected to propel CRM, which integrates people, process, and technology, from \$126.17 billion in 2026 to \$320.99 billion by 2034. As of 2025, the market is shifting toward making the CRM the central, intelligent hub for all customer-facing operations, with a heavy emphasis on data privacy and compliance.



CONCLUSION

To sum up, CRM is essential to operations and product management. It offers a methodical approach to customer relationship management, assisting companies in better understanding their clientele, raising customer satisfaction levels, and eventually boosting revenue. Businesses can increase productivity, simplify procedures, and make well-informed decisions on marketing, sales, and product development by integrating CRM with product management and operations.

The application of CRM in product management and operations can yield substantial advantages for businesses operating in any industry, including retail and technology. Businesses can create products that satisfy customers' needs and preferences by gathering and evaluating customer data, managing customer interactions, and enhancing customer satisfaction and loyalty. This will ultimately result in higher sales and profitability.

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SMART TOURISM TECHNOLOGIES AND THEIR IMPACT ON RURAL TOURIST EXPERIENCES

Ms. Anjali Hirdaylal Gupta¹, Ms. Shraddha Vijay Shewale² and ^{3*}Mr. Niraj Kumar Mishra

^{1, 2}Seva Sadan College of Arts, Science and Commerce

^{3*}Research Scholar, United World of Management, Karnavati University, Gandhinagar, Gujarat

ABSTRACT

Smart tourism technologies have become an integral part of the modern tourism industry, enhancing the overall travel experience of tourists, particularly in rural destinations. This study aims to analyze the impact of smart tourism technologies on rural tourist experiences. It focuses on the use of digital tools such as mobile applications, online reservation systems, GPS services, virtual tours, and social media in facilitating trip planning, improving access to information, and increasing tourist satisfaction.

The study is based on secondary data collected from academic journals, government reports, and reliable online resources. The findings reveal that smart tourism technologies enhance ease of travel, accessibility, safety, and interaction between tourists and local stakeholders. Furthermore, these technologies contribute to rural development by promoting local heritage, improving destination visibility, and creating employment opportunities. The study concludes that smart tourism technologies play a significant role in enriching rural tourist experiences and supporting sustainable tourism growth.

Keywords: Smart Tourism, Rural Tourism, Digital Technologies, Tourist Experience, Sustainable Tourism

INTRODUCTION

Tourism is one of the fastest-growing industries worldwide and plays a vital role in economic growth and social development. In recent years, the tourism sector has undergone significant transformation due to rapid advancements in digital and information technologies. Consequently, the concept of smart tourism has emerged, emphasizing the integration of technology with tourism services to enhance tourist experiences through innovative digital solutions.

Smart tourism technologies include mobile applications, online booking systems, GPS navigation, virtual reality, social media platforms, and digital information services. These tools assist tourists in planning travel, accessing real-time information, making online reservations, and sharing experiences. While smart tourism has been widely adopted in urban and developed destinations, its application in rural tourism remains limited and requires further exploration.

Rural tourism offers unique experiences related to local culture, traditional lifestyles, natural environments, and community-based activities. However, rural destinations often face challenges such as inadequate infrastructure, limited access to information, poor digital connectivity, and low market visibility. In this context, smart tourism technologies can serve as effective solutions by enhancing information accessibility, strengthening communication, and promoting rural destinations to a broader audience.

Therefore, this study examines the impact of smart tourism technologies on rural tourist experiences. It explores how digital tools enhance tourist satisfaction, support local communities, and encourage sustainable tourism development, highlighting the importance of adopting smart technologies to improve the competitiveness of rural tourism.

OBJECTIVES OF THE STUDY

1. To understand the concept of smart tourism and the major technologies involved.
2. To examine the significance of smart tourism technologies in rural tourism.
3. To assess the impact of digital technologies on rural tourist experiences.
4. To analyze how smart technologies enhance tourist satisfaction, comfort, and convenience.
5. To evaluate the benefits of smart tourism technologies for rural communities.

SCOPE OF THE STUDY

The study focuses on the role and influence of smart tourism technologies on tourist experiences in rural areas. It examines the use of digital tools such as mobile applications, online reservation systems, GPS services, virtual tours, social media platforms, and digital information systems.

The research relies solely on secondary data collected from books, academic journals, government publications, and credible online sources. Primary data collection methods such as surveys or interviews are not included.

The study analyzes factors such as tourist satisfaction, accessibility, ease of travel, communication, and destination promotion, along with benefits for rural communities, including employment generation, cultural preservation, and sustainable tourism development. The geographical scope is general and not limited to a specific region.

REVIEW OF LITERATURE

Smart tourism technologies have gained increasing attention due to their potential to enhance tourism experiences. Smart tourism is commonly defined as the application of digital technologies to improve convenience, information accessibility, and interaction between tourists and destinations. Previous studies emphasize that mobile applications, online booking systems, GPS navigation, and social media significantly influence tourist decision-making and travel planning.

Most existing research focuses on urban and developed destinations, highlighting improvements in destination management, service efficiency, and stakeholder communication. In contrast, studies on rural smart tourism are limited. Researchers note that rural tourism faces challenges such as inadequate infrastructure and low visibility, which smart tourism technologies can address through enhanced information dissemination and digital promotion.

Several studies also discuss the socio-economic benefits of smart tourism technologies, including income generation, support for local businesses, and cultural heritage preservation. However, challenges such as limited digital literacy, insufficient investment, and poor infrastructure hinder effective implementation in rural areas. This study seeks to bridge this gap by examining the impact of smart tourism technologies on rural tourist experiences.

RESEARCH METHODOLOGY

The study adopts a descriptive research design and is based entirely on secondary data. Data sources include academic journals, research articles, books, government reports, tourism publications, and reliable online resources.

Qualitative methods such as literature review, content analysis, and thematic analysis are used to identify key trends, benefits, and challenges associated with smart tourism technologies in rural areas.

DATA ANALYSIS AND INTERPRETATION

Data Analysis

Tourist Satisfaction:

Smart tourism tools enhance trip planning, provide real-time information, and enable personalized experiences, resulting in higher tourist satisfaction.

Accessibility and Convenience:

Digital tools improve navigation, safety, and access to essential services in rural destinations.

Communication and Interaction:

Social media and digital platforms facilitate engagement between tourists and local communities.

Destination Promotion and Rural Development:

Smart technologies improve visibility, attract tourists, support local businesses, and generate employment.

Challenges:

Limited internet connectivity, low digital literacy, and inadequate infrastructure restrict effective adoption.

Interpretation

Smart tourism technologies significantly enhance rural tourist experiences while supporting economic growth and sustainable development. Addressing infrastructural and digital literacy issues is essential for successful implementation.

DATA SOURCES

- Academic journals and research articles
- Books and reference materials
- Government reports and publications
- Tourism magazines and industry reports
- Reliable online sources

Sample Design

The study analyses 30–40 credible secondary sources selected based on relevance, reliability, and focus on smart tourism, rural tourism, and tourist experiences.

Tools and Techniques

Literature review, content analysis, thematic analysis, descriptive analysis, qualitative interpretation, and comparative analysis.

Limitations of the Study

The study is based solely on secondary data and does not focus on a specific rural region. Rapid technological changes and limited rural adoption data may affect comprehensiveness.

HYPOTHESES

H1: Smart tourism technologies positively influence tourist satisfaction in rural areas.

H2: Smart tourism technologies enhance accessibility and convenience.

H3: Smart tourism technologies improve communication between tourists and local service providers.

H4: Smart tourism technologies promote rural destinations and local economic development.

H5: Poor connectivity and low digital literacy negatively affect effectiveness.

FINDINGS OF THE STUDY

Smart tourism technologies positively impact rural tourist experiences by improving planning, accessibility, communication, and destination promotion. Despite challenges, they support rural development, cultural preservation, and sustainable tourism growth.

CONCLUSION

Smart tourism technologies play a crucial role in transforming rural tourism by enhancing tourist experiences, promoting destinations, and supporting local economies. Addressing infrastructure and digital literacy gaps is essential to fully realize their potential.

SUGGESTIONS

- Improve digital infrastructure and internet connectivity
- Provide digital literacy training to local communities
- Integrate local culture into digital platforms
- Strengthen collaboration between government, tourism bodies, and technology providers
- Use social media and virtual tours for destination promotion

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**RESPONSIBLE ARTIFICIAL INTELLIGENCE IN NATURAL LANGUAGE PROCESSING:
BALANCING INNOVATION, ETHICAL CHALLENGES, AND FUTURE PROSPECTS**

Anjali SrivastavResearch Scholar, Chhatrapati Shivaji Maharaj University
angelsoniiii93@gmail.com**ABSTRACT**

Modern digital development is heavily reliant on artificial intelligence, which affects how data is generated, processed, and disseminated. Natural Language Processing is one of the most influential fields of artificial intelligence since it enables computer systems to communicate with human language in a meaningful way. The effectiveness of NLP systems has greatly improved over the last ten years thanks to advancements in machine learning and deep learning approaches. Consequently, apps like virtual assistants, automated translation programs, sentiment analysis systems, and content creation platforms are now commonplace.

The widespread use of NLP technologies, however, has raised a number of moral and societal issues, notwithstanding these advantages. Language models frequently depend on massive amounts of textual material, which might contain inaccurate or biased facts. The outcome may be unjust or erroneous outputs that impact communities and individuals. Furthermore, researchers and politicians have focused on issues such as user privacy, opaque decision-making procedures, and the misuse of automated language technologies.

The research is based on a qualitative examination of recent public debate, policy papers, ethical frameworks, and scholarly literature. It pinpoints significant ethical issues in NLP systems and promotes responsible AI methods that can mitigate risks while fostering technological development. The paper also discusses potential directions for the responsible development of NLP, focusing on ethical-by-design methods, explainability, and inclusive governance.

Keywords: *Responsible Artificial Intelligence; Natural Language Processing; Ethical Challenges; Algorithmic Bias; Explainable AI; AI Governance*

1. INTRODUCTION

Today's digital world depends on artificial intelligence as an essential element affecting our means of communication, decision-making, and information gathering. One of the most significant areas of artificial intelligence is Natural Language Processing (NLP), which lets machines meaningfully interact with human speech. Big language models, deep learning, and machine learning breakthroughs have led to major changes in natural language processing (NLP) systems. These days our daily lives include language translation resources, automatic content generation technologies, virtual assistants, and chatbots.

Still, the widespread usage of NLP tools has brought up some major moral and social problems. Language models are trained with great volumes of textual data, some of which may contain false, prejudiced, or hazardous material. Thus, NLP systems may accidentally reproduce societal inequalities or provide improper and erroneous outcomes. Discussions on the moral growth of artificial intelligence have been driven by data privacy issues, a lack of openness and responsibility, and the misapplication of language tools.

Given these concerns, the idea of responsible artificial intelligence has gained more attention. Responsible AI seeks to build equitable, transparent, responsible, and human-values-oriented artificial intelligence systems. Regarding NLP, responsible artificial intelligence seeks to reduce the chance of harm while guaranteeing that language technologies help society. However, the complexity of contemporary language models, commercial constraints, and the rate of technological developments make it challenging to apply ethical artificial intelligence criteria in NLP.

This research examines ethical dilemmas, existing systems, popular beliefs, and possible directions for investigation of responsible artificial intelligence in NLP. Its aim is to find a balance between ethical responsibilities and developments in NLP so as to create dependable and AI systems that ensure durability, accountability, and ethical continuity.

2. LITERATURE REVIEW

In the field of natural language processing (NLP), the literature on responsible artificial intelligence shows increasing attention to striking a balance between technological innovation and moral duty. The advantages and hazards of AI-driven language technologies have been studied by experts in computer science, philosophy, social sciences, and policy studies.

2.1 NLP and the Creation of Artificial Intelligence

The symbolic and rule-based methods used in the early days of NLP research necessitated human intervention and explicit linguistic guidelines. NLP systems became more data-driven and adaptive as a result of the development of machine learning methods. Recent breakthroughs in transformer-based models and deep learning have greatly increased machines' capacity for producing and comprehending human language. These advancements have made numerous applications possible, including virtual assistants, chatbots, automated translation, and content creation.

Researchers, however, warn that greater model complexity also brings up ethical issues. The societal effects of NLP systems need to be thoroughly studied as they get more independent and powerful. In order to avoid unforeseen effects, Russell (2019) contends that sophisticated AI systems must continue to be in line with human values and run under significant human supervision.

2.2 The Moral Underpinnings of Accountable Artificial Intelligence

Ethical philosophy and human-centered design principles have a significant influence on the idea of responsible AI. Floridi (2019) suggests one of the most significant ethical frameworks for artificial intelligence, highlighting that AI systems should advance human dignity, autonomy, and societal well-being. He emphasizes in his research that ethical principles should be incorporated into the early stages of AI design, rather than being considered as an afterthought.

This claim is further supported by recent research. Gunasekara et al. (2025) conduct a thorough systematic assessment of global responsible AI principles, finding that ethical values like fairness, transparency, accountability, and privacy are widely accepted, but their actual application varies among different AI applications. The study emphasizes that, when applied to actual AI systems, such as NLP technology, ethical standards frequently lack operational clarity. This result highlights the necessity of addressing the disconnect between ethical theory and practical AI development.

Additionally, international ethical norms advocated by bodies like UNESCO, the OECD, and the European Commission continue to prioritize fairness, transparency in procedures, clear accountability, and ongoing human participation. Recent research, though, suggests that converting these concepts into practical NLP applications is still a difficult task.

2.3 Fairness and Prejudice in NLP Systems

Academic publications have extensively documented the bias in NLP systems. Large textual datasets used to train language models frequently inherit historical and social biases that are present in the data sources. According to research on language representations and word embeddings, NLP systems may unintentionally perpetuate cultural, racial, and gender stereotypes.

The fast growth of big language models is analyzed critically by Gebru and Bender (2021), who caution that when these systems are implemented without ethical safeguards, they have the potential to worsen inequality, misinformation, and systemic prejudice. Crawford (2021) goes on to say that AI systems are influenced by political, economic, and social power dynamics, rather than being neutral instruments.

These worries are supported by empirical studies conducted recently. Fairness-evaluation frameworks, like Fairlearn and IBM's AIF360, are used by Rashed et al. (2025) to examine fairness in both natural language processing and computer vision models. Their results show that bias reduction necessitates a methodical evaluation of the full AI pipeline, from data gathering to model training and implementation. This research emphasizes that fairness in natural language processing is not simply a technical problem but also an ethical and regulatory one.

2.4 Openness, Clarity, and Accountability

One of the biggest drawbacks of current NLP systems is their poor interpretability. Language models based on deep learning are frequently "black boxes," making it hard to comprehend how choices are made. When NLP systems are used in delicate sectors like law, education, and government decision-making, this ambiguity diminishes accountability and erodes trust.

Floridi and COWLS (2019) contend that transparency alone is not enough without ethical governance frameworks and accountability mechanisms. As a result, explainability must be integrated into a more comprehensive responsible AI environment.

Recent research expands on this topic. A responsible AI framework that combines social-cognitive principles with explainable AI methods is suggested by Shamsuddin, Rittika, and Tabrizi (2025). Their study highlights that explainability should address social expectations and user trust in addition to technical comprehension. For

NLP systems that engage with people directly and have an impact on knowledge production and decision-making, this strategy is especially important.

2.5 Data Ethics, Surveillance, and Privacy

An additional major theme in the literature on NLP ethics is the protection of privacy. Huge datasets, some of which may contain private or sensitive information, are necessary for big language models. Data-driven technologies, according to Zuboff (2019), contribute to "surveillance capitalism," in which personal data is collected and used without sufficient permission.

Scholars in the field of NLP emphasize the need for ethical data management, which includes data reduction, anonymization, and data protection. To safeguard user rights, responsible AI frameworks advise restricting data acquisition and enforcing adherence to privacy laws.

2.6 Public Discussion and Societal Views on Bias in Artificial Intelligence

The influence of public discussion in determining attitudes toward AI ethics is becoming more and more recognized in recent research. Algorithmic bias and fairness are topics of widespread discussion in the media and in public statements made by educators, politicians, and members of civil society. These discussions highlight that ethical AI is a social problem as well as a technical one.

Floridi (2019) and Crawford (2021) both highlight the need of addressing public concerns in order to establish faith in AI systems. Transparency, inclusive evaluation, and accountable communication are all necessary to combat perceived bias and ensure the long-term viability of AI adoption.

2.7 Research Gap

There are still major gaps between ethical frameworks and actual implementation practices, despite the wealth of study on ethical AI concepts and NLP advances. Numerous research concentrates on technical performance or abstract ethical values, failing to adequately discuss how responsible AI concepts may be put into practice in actual NLP systems.

According to recent systematic reviews, ethical standards frequently remain theoretical and lack real-world enforcement methods. Additionally, the impact of public discourse and societal attitudes on the ethical creation of NLP is still understudied. An integrated strategy that includes ethical theory, technological innovation, governance structures, and community participation is necessary to close these gaps.

3. OBJECTIVES OF THE STUDY

The present study is guided by the following objectives:

1. To examine the role of artificial intelligence in the development of natural language processing technologies.
2. To identify the major ethical challenges associated with AI-based NLP systems.
3. To review existing ethical frameworks and governance approaches related to responsible AI.
4. To explore the influence of public discourse on perceptions of AI bias.

4. METHODOLOGY

The qualitative research approach used in this study relies heavily on a thorough analysis of secondary sources. Articles from peer-reviewed journals, scholarly publications, ethical codes, and policy papers released between 2018 and 2025 were examined. The Scopus-indexed journals and reputable institutional publications were chosen as sources. The ethical concerns and best practices for responsible AI in NLP were found using a thematic analysis approach. A qualitative review method was chosen because ethical issues in NLP require interpretive and conceptual analysis rather than numerical measurement.

5. MORAL DILEMMAS (CHALLENGES) IN NATURAL LANGUAGE PROCESSING

At various points throughout the development and implementation of NLP, ethical issues might surface. The lack of transparency diminishes accountability, but biased training data might result in biased outputs. Additionally, NLP systems can be abused to produce misleading or harmful material, such as disinformation and deepfake text. The necessity for moral protections, ongoing monitoring, and human supervision in NLP systems is highlighted by these issues.

6. SOCIETAL VIEWS OF BIAS IN AI SYSTEMS AND PUBLIC DISCOURSE

Public opinion is now widely acknowledged in academic debates as a key factor in influencing trust and acceptance of artificial intelligence technologies. Public forums and the media frequently mirror wider societal concerns about equity, representation, and prejudice in AI systems, in addition to peer-reviewed research. Even though these debates are not based on facts, they shed light on how society views AI technology.

A prominent civil services educator in India sparked a lot of debate with a recent statement about the possibility that AI-generated material might be skewed. Even if such claims are not evidence of algorithmic bias in science, they do show society's concerns about the impact of big language models on the production and distribution of knowledge. According to studies, public confidence in AI systems might be significantly impacted by perceived bias, even if it cannot be proven empirically.

Experts claim that a comprehensive AI governance strategy must take into consideration both societal perceptions and technical bias. Responsible communication, transparency, and explainability are crucial for fostering trust and making sure NLP technologies are used ethically.

7. DISCUSSION

The study emphasizes the need to strike a delicate balance between ethical duty and creativity in NLP. Although sophisticated language models provide efficiency and scalability, they also raise ethical concerns about prejudice, privacy, and misuse. These issues can only be resolved by using responsible AI practices like bias reduction, explainable AI, ethical data governance, and human oversight. The necessity of aligning AI systems with societal values and expectations is also highlighted in the public debate.

8. THE FUTURE OF NLP'S ACCOUNTABLE AI

The integration of ethical considerations into system design and administration is crucial for the future of NLP. Responsible NLP development is anticipated to be guided by ethical-by-design strategies, explainable AI technologies, and more stringent regulatory frameworks. A crucial factor in ensuring sustainable and inclusive AI innovation will be interdisciplinary cooperation between technologists, ethicists, social scientists, and policymakers.

9. CONCLUSION

By enabling machines to comprehend and produce human language more effectively than ever before, artificial intelligence has revolutionized the field of Natural Language Processing. The use of AI-based NLP technologies is now common in business, healthcare, education, government, and online communication. Although these technologies offer efficiency and convenience, they also raise significant ethical questions that cannot be ignored.

According to this study, it is imperative to utilize artificial intelligence responsibly in natural language processing in order to prevent technological advancements from harming people or society. AI systems can have negative consequences if ethical principles are ignored, as evidenced by issues including biased language outputs, a lack of transparency in decision-making processes, the misuse of generated content, and threats to personal data. As a result, responsibility in AI should be regarded as a core need rather than an elective one.

The study also highlights that the ethical problems in NLP go beyond just technological concerns. Trust in AI technologies is significantly influenced by social views and popular opinion. People's adoption and application of AI systems are impacted even if concerns about bias are merely based on perception rather than objective evidence. Therefore, AI developers and institutions must engage in open communication with the public and address ethical issues honestly and responsibly.

The long-term viability of NLP technologies depends on the inclusion of ethical principles at every stage of AI development, training, and implementation. The development of fair, inclusive, and accountable AI systems requires collaboration between computer scientists, social scientists, politicians, and educators. Effective governance frameworks, continuous monitoring, and strong ethical principles can all help to make sure that NLP technology benefits humanity rather than harm it.

In conclusion, the future of artificial intelligence in natural language processing depends on finding a balance between innovation and moral obligation. Good AI practices can help create reliable systems that respect human dignity, advance fairness, and support societal progress. AI-driven NLP technologies may be made into potent instruments for development while reducing ethical hazards by using a human-centered strategy.

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GREEN INFLUENCER MARKETING AND CONSUMER PURCHASE BEHAVIOUR: THE ROLE OF AUTHENTICITY, TRUST, AND ENVIRONMENTAL CONCERN

Ms. Bharti. M. Jaiswani

H & G.H. Mansukhani Institute of Management, opp. Ulhas station, UNR-3.

1. ABSTRACT

Green marketing has gained significant importance due to increasing environmental concerns and the growing demand for sustainable products. Simultaneously, influencer marketing has emerged as a powerful digital marketing tool shaping consumer perceptions and purchasing decisions. This study focuses on green influencer marketing and its impact on consumer purchase behaviour. The research examines how influencer authenticity, trust, environmental concern, and perceived green washing influence consumers' intention to purchase green products. Based on an extensive review of existing literature, the study highlights the critical role of credible and transparent influencer communication in promoting sustainable consumption. The paper also identifies research gaps and offers practical suggestions for marketers, influencers, and policymakers to enhance the effectiveness of green influencer marketing strategies.

2. INTRODUCTION

In recent decades, environmental degradation, climate change, and the depletion of natural resources have emerged as critical global challenges. Growing public awareness of these issues has significantly influenced consumer attitudes, leading to an increased preference for environmentally responsible products and brands. As a result, organizations across industries have adopted green marketing practices to position their products as sustainable, eco-friendly, and socially responsible. Green marketing not only serves as a response to environmental concerns but also functions as a strategic tool for gaining competitive advantage in increasingly conscious markets.

At the same time, rapid advancements in digital technology and social media platforms have transformed traditional marketing communication. Influencer marketing has emerged as a powerful digital marketing strategy, where individuals with substantial online followings influence consumer opinions, attitudes, and purchasing decisions. Influencers are often perceived as relatable, credible, and trustworthy sources of information, making their endorsements more persuasive than conventional advertising. Their ability to create engaging content and foster personal connections with followers has made influencer marketing particularly effective among younger and digitally active consumer segments.

The convergence of these two trends has given rise to green influencer marketing, a contemporary marketing approach in which social media influencers promote environmentally friendly products, sustainable lifestyles, and responsible consumption practices. Green influencers often advocate sustainability through personal experiences, storytelling, and demonstrations, which can make green messages more accessible and appealing to consumers. This approach has the potential to not only influence purchase decisions but also encourage long-term behavioural change toward sustainable consumption.

Therefore, this study aims to bridge this research gap by examining the impact of green influencer marketing on consumer purchase behaviour. By synthesizing existing literature and identifying key influencing factors, the study seeks to provide valuable insights for marketers, influencers, and policymakers. Understanding these dynamics can help organizations design more credible, transparent, and effective green influencer marketing strategies that promote sustainable consumption while maintaining consumer trust.

3. OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

1. To examine the concept of green influencer marketing.
2. To analyse the impact of green influencer marketing on consumer purchase behaviour.
3. To study the role of influencer authenticity and trust in shaping purchase intention.
4. To examine the effect of perceived green washing on consumer responses.
5. To provide suggestions for improving the effectiveness of green influencer marketing.

4. LITERATURE REVIEW

1. Wang, Wang, and Zhang (2021), in the Journal of Cleaner Production, examined consumers' responses to green marketing strategies and found that perceived environmental responsibility positively affects green

purchase intention. Their study highlights that consumers are more likely to support brands that demonstrate genuine commitment.

2. Testa et al. (2022), publishing in *Business Strategy and the Environment*, reported that environmental concern and green perceived value significantly influence consumers' willingness to purchase eco-friendly products, indicating the importance of value-based green communication.

3. Sokolova and Kefi (2021), in the *Journal of Retailing and Consumer Services*, found that influencer credibility and parasocial interaction significantly influence consumers' purchase intentions on social media platforms. Their research confirmed that trust plays a crucial mediating role between influencer endorsements and buying decisions.

4. Masuda, Han, and Lee (2022), in the *Journal of Business Research*, demonstrated that social media influencers significantly affect brand attitudes and purchase intention, especially among younger consumers who perceive influencers as more relatable than traditional celebrities.

5. Ki, Cuevas, Chong, and Lim (2024), in the *Journal of Advertising*, reported that trust mediates the relationship between influencer credibility and purchase intention, particularly in sustainability-focused campaigns.

6. Munaro, Martins, and Gonçalves (2024), in the *Journal of Business Research*, conducted a systematic literature review and concluded that green influencers positively impact sustainable consumption when credibility and value congruence are present.

7. Fang (2024), publishing in *Sustainability*, found that perceived green washing negatively moderates the relationship between green influencer marketing and purchase intention. The study revealed that even highly popular influencers lose credibility when associated with exaggerated or false green claims.

5. STATEMENT OF THE PROBLEM

Despite growing interest in sustainable consumption, consumers often remain skeptical of green claims made by brands and influencers. The increasing incidence of green washing has further reduced trust in green marketing communications. While influencer marketing is widely used, there is limited empirical research examining how influencer authenticity, trust, and perceived green washing collectively influence green purchase behaviour. Therefore, the problem addressed in this study is the lack of a comprehensive understanding of the effectiveness of green influencer marketing in shaping consumer purchase decisions.

6. FINDINGS

1. Green influencer marketing positively influences consumer purchase intention when messages are perceived as authentic.
2. Influencer trust plays a mediating role between green marketing communication and purchase behaviour.
3. Perceived green washing negatively affects consumer trust and purchase intention.
4. Consumers with higher environmental concern are more responsive to green influencer messages.
5. Transparency and credibility enhance the effectiveness of green influencer marketing campaigns.

7. SUGGESTIONS

1. Brands should collaborate with influencers who genuinely support sustainability and eco-friendly practices.
2. Influencers should maintain transparency by clearly disclosing paid partnerships and providing factual information.
3. Environmental claims should be supported by certifications and verifiable data to reduce skepticism.
4. Marketers should segment consumers based on environmental concern and design targeted green campaigns.
5. Policymakers and digital platforms should regulate misleading green claims to prevent green washing.
6. Influencer content should not merely promote products but also educate consumers about environmental benefits, usage practices, and sustainability impacts. Informative content enhances message quality and persuasion.
7. Influencers should endorse green products only if they genuinely believe in and use them. Consistency in promoting sustainable practices strengthens perceived authenticity and trust.

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8. Consumers should be encouraged to verify environmental claims and rely on credible information sources rather than blindly trusting influencer endorsements.
 9. Collaboration between governments, industry bodies, and digital platforms can promote ethical green marketing practices and sustainable consumption.
 10. Collaboration between governments, industry bodies, and digital platforms can promote ethical green marketing practices and sustainable consumption.

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ROLE OF ARTIFICIAL INTELLIGENCE IN SHAPING CONSUMER TRUST IN E-COMMERCE PLATFORMS IN THANE DISTRICT

¹Dr. Pandurang Tukaram Pawar and ²Chandan R. Devidasani

¹M. Com, M.Phil., PhD, Shivaji Mahavidyalaya Renapur. Dist. Latur

²Assistant Professor, B. Com, M. Com (Banking & Finance), B. Ed, MBA – HR, Ph.D. Scholar, K. M. Agrawal College of Arts, Commerce & Science, Kalyan (w), 421301

ABSTRACT

The rapid expansion of e-commerce has increased the importance of consumer trust, especially in an environment where transactions are virtual and data-driven. Artificial Intelligence (AI) has emerged as a crucial tool in enhancing trust by improving personalization, security, and customer service on e-commerce platforms. This study examines the role of Artificial Intelligence in shaping consumer trust in e-commerce platforms in Thane district. Primary data was collected from 100 online shoppers using a structured questionnaire. The study focuses on key AI applications such as personalized product recommendations, AI-powered chatbots, and fraud detection systems. The findings indicate that AI-driven security measures and personalized services significantly enhance consumer confidence and trust, leading to higher purchase intention and repeat usage. The study highlights that transparency in AI usage and consumer awareness further strengthen trust. The paper concludes that responsible and customer-centric implementation of AI is essential for building long-term trust in e-commerce platforms.

Keywords: Artificial Intelligence, Consumer Trust, E-Commerce Platforms, Online Shopping Behaviour, Digital Security, Thane District

1. INTRODUCTION

The growth of digital technology has revolutionized the way consumers purchase goods and services, with e-commerce becoming an integral part of everyday life. Despite its convenience and accessibility, e-commerce faces a major challenge in the form of consumer trust, as buyers cannot physically inspect products or interact directly with sellers. Concerns related to data privacy, online fraud, and service reliability often influence consumer decisions while shopping online.

Artificial Intelligence (AI) has become a powerful solution to address these challenges. E-commerce platforms increasingly rely on AI technologies such as machine learning algorithms, chatbots, and predictive analytics to enhance user experience, ensure secure transactions, and offer personalized recommendations. These AI-driven features help reduce uncertainty, improve transparency, and create a sense of reliability among consumers.

In districts like Thane, where digital adoption is rapidly increasing across different age groups, understanding how AI influences consumer trust is particularly important. This study aims to explore the perception of consumers towards AI-enabled features on e-commerce platforms and examine their role in building trust and confidence in online shopping. The findings of this research provide valuable insights for e-commerce companies to strengthen consumer relationships through effective and ethical use of Artificial Intelligence.

2. OBJECTIVE OF THE STUDY

The main objectives of this study are:

- i. To identify how AI applications affect consumer trust on e-commerce platforms.
- ii. To analyze which AI mechanisms (e.g., chatbots, personalized recommendations, fraud detection) have the strongest impact on trust among Thane shoppers.
- iii. To suggest strategies for e-commerce platforms to leverage AI in building and maintaining consumer confidence.

3. NEED FOR THE STUDY

With expanding online markets, consumers are increasingly aware of privacy violations, fraud, and poor customer service. E-commerce platforms use AI tools to bridge gaps in trust by:

- i. Enhancing security through fraud detection
- ii. Providing immediate customer responses via chatbots
- iii. Offering personalized product suggestions

However, there is limited localized research on how these AI applications influence consumer trust specifically in Thane district. This study fills that gap and helps regional businesses fine-tune their AI strategies.

4. LIMITATIONS OF THE STUDY

While every effort was made to conduct comprehensive research, the study has the following limitations:

- i. The sample was limited to consumers residing in Thane district, so findings may not be generalizable to other regions.
- ii. Responses depend on self-reported perceptions, which could lead to bias.
- iii. Rapid changes in AI technology mean findings may evolve as new tools are introduced.

5. HYPOTHESIS

The study tests the following hypotheses:

H1: There is a positive relationship between the use of AI features and consumer trust on e-commerce platforms.

H2: AI-driven security measures (e.g., fraud detection) have a stronger influence on trust compared to other AI features.

H3: Consumers with higher awareness of AI applications exhibit greater overall trust in e-commerce services.

6. LITERATURE REVIEW

Research on Artificial Intelligence (AI) in e-commerce has evolved significantly over recent years, particularly in relation to consumer trust.

Ahire (2025) examined the relationship between AI-driven personalization and perceived privacy risk in online shopping environments. The study found that while AI improves customization and convenience, concerns about data security may reduce consumer confidence if privacy safeguards are not clearly communicated.

Sipos (2025) analyzed the effects of AI-powered recommendation systems on consumer trust and purchase intention. The findings indicated that relevant and accurate product suggestions positively influence perceived usefulness, which in turn enhances trust and satisfaction.

Hassan, Abdelraouf, and El-Shihy (2025) explored the trust–satisfaction–loyalty relationship in AI-enabled e-commerce platforms. Their research highlighted that personalized recommendations strengthen the connection between trust and customer loyalty, suggesting that AI can contribute to long-term consumer engagement.

Jith et al. (2025) focused on the impact of AI-based personalization on consumer purchase intention. The study concluded that personalization increases buying decisions; however, transparency in data usage is essential to maintain consumer trust.

Thorne and Vance (2025) discussed the concept of the “trust paradox” in algorithmic commerce. They argued that while AI enhances efficiency and convenience, the lack of explainability in algorithmic decisions may create uncertainty among users. The authors emphasized the importance of Explainable AI (XAI) in strengthening consumer confidence.

Aydin (2026) examined the psychological dimensions of brand trust in AI-driven personalization. The study explained that consumers evaluate both the benefits (convenience and relevance) and risks (privacy invasion) before forming trust perceptions. When benefits outweigh perceived risks, trust levels increase.

Overall, recent studies consistently indicate that AI applications such as personalized recommendations, chatbots, and fraud detection systems positively influence consumer trust. However, transparency, data privacy protection, and ethical AI implementation remain critical determinants of sustained trust.

Research Gap : Although existing literature extensively examines AI and consumer trust at a global level, limited research has focused on localized Indian contexts, particularly at the district level. Differences in digital awareness, technological familiarity, and privacy perceptions may influence trust differently across regions. Therefore, this study seeks to bridge this gap by analyzing the role of AI in shaping consumer trust specifically among e-commerce users in Thane district.

7. RESEARCH METHODOLOGY

Type of Research: Descriptive Research

Data Source: Primary data

Tool Used: Structured questionnaire

Sample Size: 100 respondents

Sampling Method: Convenience sampling was adopted due to accessibility constraints and time limitations.

Target Group: Active e-commerce users aged 18–55

8. SURVEY QUESTIONNAIRE (12 QUESTIONS)

Data Analysis and Presentation (100 Responses)

8.1 Tabulated Responses - No. of Responses (n=100)

Q1 Online Shopping Frequency

Daily	18
Weekly	42
Monthly	28
Rarely	12

Q2 Age Group

Below 20	14
21–30	38
31–40	29
Above 40	19

Q3 Awareness of AI Usage

Yes	86
No	14

Q4 Most Noticed AI Feature

Product Recommendations	34
Chatbots	22
Price Comparison	21
Security Alerts	23

Q5 AI Influences Purchase Decision

Strongly Agree	26
Agree	39
Neutral	21
Disagree	14

Q6 Satisfaction with AI Chatbots

Very Satisfied	19
Satisfied	33
Neutral	37
Dissatisfied	21

Q7 Security Alerts Build Trust

Yes	68
No	32

Q8 AI Provides Personalized Experience

Yes	74
No	26

Q9 Concern about Data Privacy

Yes	61
No	39

Q10 Trust in AI-Based Reviews & Ratings

Yes	64
No	36

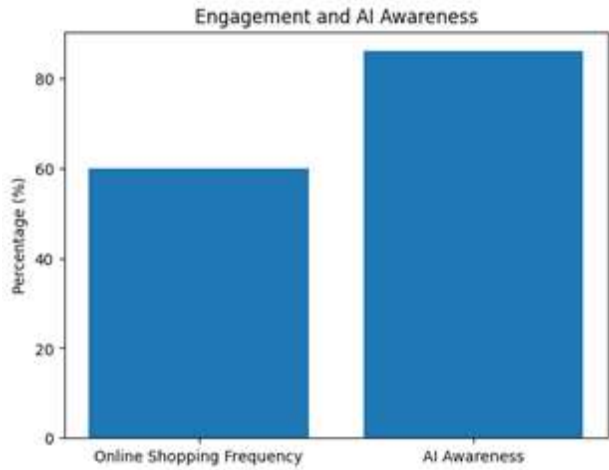
Q11 AI Reduces Purchase Uncertainty

Yes	71
No	29

Q12 AI Increases Overall Trust

Yes	73
No	27

INTERPRETATION OF RESULTS

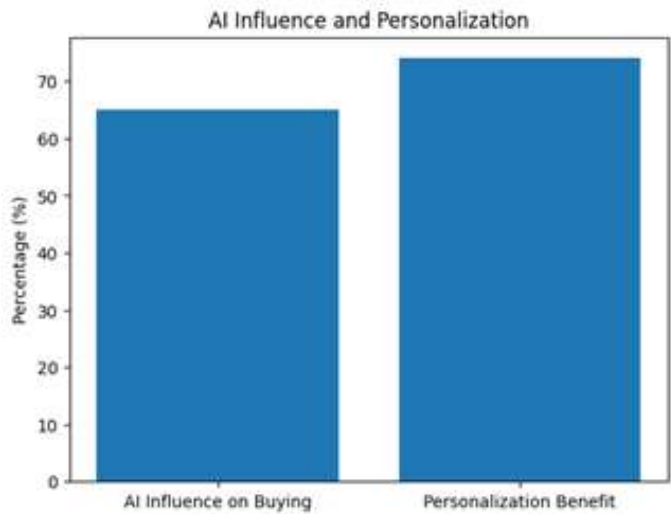


Graph 1: Engagement and AI Awareness

- Online Shopping Frequency (60%)
 - AI Awareness (86%)
- i. **Shopping Behaviour:** 60% of respondents shop online either daily or weekly, indicating high engagement with AI-enabled platforms.
- ii. **AI Awareness:** A large majority (86%) are aware of AI usage, suggesting increased technological familiarity.

Graph 2: AI Influence and Personalization

- AI Influence on Buying Decisions (65%)
- Personalization Benefit (74%)

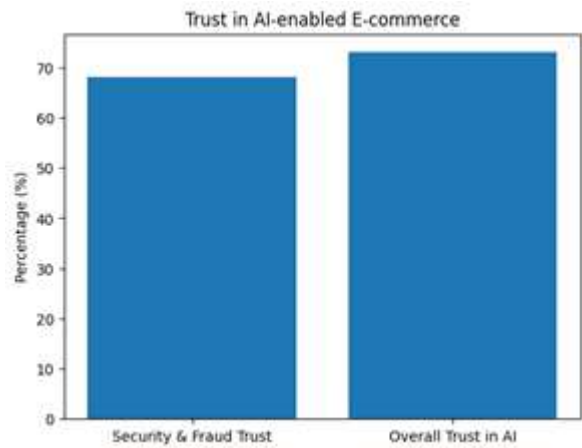


- iii. **Buying Influence:** 65% agree that AI recommendations influence their purchase decisions.
- iv. **Personalization:** 74% believe AI enhances personalization, strengthening platform loyalty.

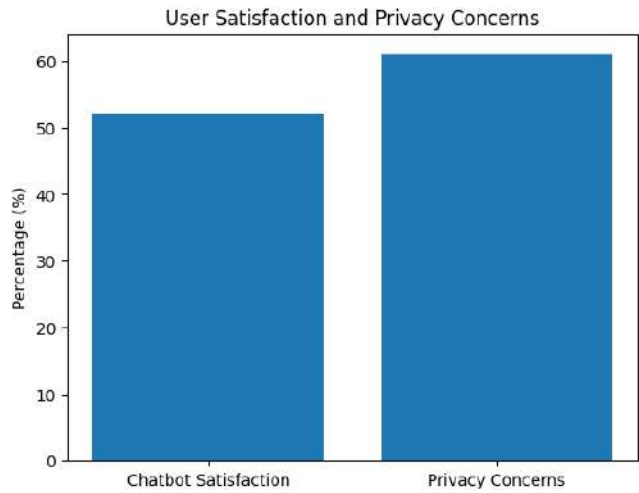
Graph 3: Trust in AI-enabled E-commerce

- Security & Fraud Trust (68%)

- Overall, Trust in AI (73%)



- v. **Security & Fraud Prevention:** This indicates that security-oriented AI applications play a stronger trust-building role compared to service-oriented AI tools such as chatbots.
- vi. **Overall, Trust:** 73% confirm that AI positively impacts trust in e-commerce platforms.



Graph 4: User Satisfaction and Privacy Concerns

- Chatbot Satisfaction (52%)
 - Privacy Concerns (61%)
- vii. **Chatbot Performance:** While 52% are satisfied, 21% dissatisfaction highlights the need for improvement.
 - viii. **Privacy Concerns:** 61% worry about misuse of personal data, showing trust limitations.

8. FINDINGS & SUGGESTIONS

Findings

- 1) Artificial Intelligence plays a significant role in enhancing consumer trust in e-commerce.
- 2) Personalized recommendations are the most impactful AI feature.
- 3) AI-driven security systems improve confidence in digital transactions.
- 4) Despite benefits, data privacy remains a major concern.
- 5) Overall consumer perception of AI is positive but cautious.

The survey results indicate that AI features positively influence consumer trust. Security-related AI applications appear to have a stronger impact compared to other features. Higher awareness of AI is also associated with greater trust among consumers.

Suggestions

- i. **Increase Transparency:** E-commerce platforms should clearly communicate how AI protects user data and enhances experience.
- ii. **User Education:** Short guides explaining AI features can help reduce fear or misconceptions.
- iii. **Enhance Security Messaging:** Prominently display AI-based fraud protection during checkout to reassure users.
- iv. **Improve Chatbot Training:** Better natural language processing and human handoff options can strengthen trust.
- v. **Feedback Mechanism:** Allow users to rate or comment on AI interactions to continuously improve the system.

9. CONCLUSION

This study highlights the growing importance of Artificial Intelligence in strengthening consumer trust within e-commerce platforms in Thane district. The findings reveal that AI-enabled tools such as fraud detection systems, personalized recommendations, and automated customer support contribute positively to users' confidence in online transactions. Among these, security-related features play a particularly crucial role, as consumers place high importance on the safety of their personal and financial information.

Although AI enhances convenience and improves the overall shopping experience, concerns regarding data privacy continue to influence trust levels. The results suggest that technology alone does not guarantee consumer confidence; rather, trust is built when AI systems are implemented responsibly, transparently, and ethically. Consumers who understand how AI functions and how their data is managed tend to exhibit higher levels of trust toward e-commerce platforms.

Overall, the research indicates that the effective and ethical use of Artificial Intelligence can serve as a strong foundation for long-term customer relationships. E-commerce companies that prioritize transparency, security, and user awareness are more likely to achieve sustained trust, customer satisfaction, and repeat patronage in the evolving digital marketplace.

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ARTIFICIAL INTELLIGENCE IN EDUCATION

Chhaya Ravindra Shelke

Assistant Professor, Swayam Siddhi College of Education, Bhiwandi

ABSTRACT

Artificial Intelligence (AI) is quickly changing education by improving teaching, learning, and administrative tasks. AI tools like intelligent tutoring systems, adaptive learning platforms, automated assessments, and learning analytics create personalized learning experiences tailored to each learner's needs, abilities, and pace. By examining large amounts of educational data, AI helps educators find learning gaps, predict student performance, and offer timely support, which can improve learning outcomes and lower dropout rates. AI also assists teachers by automating routine jobs like grading, attendance, and organizing content. This allows teachers to focus more on teaching, creativity, and engaging with students. Moreover, AI-powered chatbots and virtual assistants provide ongoing academic support, encouraging self-directed and lifelong learning. However, using AI in education raises important issues about data privacy, ethical use, algorithmic bias, and the digital divide. Effective use of AI requires strong policies, teacher training, and responsible AI guidelines that match educational values. Overall, AI has great potential to make education more inclusive, efficient, and centered on learners, as long as it is used as a helpful tool that supports human intelligence instead of replacing teachers.

Keywords: Artificial Intelligence (AI), Intelligent Tutoring Systems, Adaptive Learning, AI in Education

1. INTRODUCTION

Techniques of learning have changed based on various technological advancements. The printing press began the movement for educational innovation and as computer technology and internet technology advanced the educational process was a major reason for this evolution in learning. In the early twenty-first century, artificial intelligence (AI) has become extremely important to the future of education. The definition of artificial intelligence is: "machines or computer systems that are capable of performing tasks that typically would otherwise require human intelligence, such as learning, reasoning, problem solving, decision making, and understanding language." the application of ai in education is to improve learning experiences, improve teaching efficiency, and improve administration of educational programs.

With the growing diversity of learners, increasing need for personalized education, and the rapid growth of digital learning environments, intelligent systems that can respond appropriately to individual needs are required. Ai educational resources provides an opportunity to create learner-centered, inclusive, efficient, and outcome driven forms of education. At the same time, the integration of ai also presents many ethical, social and pedagogical issues that must be addressed. This paper will outline the definition of ai in education, its current uses, benefits, barriers, and future opportunities.

2. CONCEPT OF ARTIFICIAL INTELLIGENCE IN EDUCATION

Artificial Intelligence in Education (AIED) refers to the use of AI technologies to facilitate, support, and improve teaching, learning, and educational management. AI systems are designed to collect and analyze learner data, recognize patterns, and make decisions or recommendations to enhance educational outcomes.

Key AI technologies used in education include:

- Machine Learning – systems learn from data and improve over time.
- Natural Language Processing (NLP) – enables machines to understand and respond to human language.
- Data Analytics and Learning Analytics – analyze student behavior and performance.
- Intelligent Agents and Chatbots – provide real-time assistance and feedback.
- Unlike traditional educational technologies, AI systems are adaptive, interactive, and predictive in nature. They do not merely deliver content but respond dynamically to learners' progress and needs.

3. NEED FOR AI IN EDUCATION**The integration of AI in education has become necessary due to several reasons:**

- Diverse Learning Needs: Students differ in ability, learning pace, interests, and background. AI enables personalized instruction.
- Large Class Sizes: Teachers face difficulty in providing individual attention; AI tools can support personalized feedback.

- Digital Transformation: Online and blended learning environments require intelligent systems for effective management.
- Skill-Oriented Education: AI supports competency-based and outcome-based education.
- Data-Driven Decision Making: Educational institutions need accurate data insights for planning and improvement.

Thus, AI is seen as a solution to many long-standing challenges in education.

4. APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN EDUCATION

4.1 Personalized Learning

One of the most significant contributions of AI is personalized learning. AI-powered adaptive learning platforms analyze students' learning patterns, strengths, and weaknesses and adjust content accordingly. Students can learn at their own pace, revisit difficult topics, and receive customized learning paths.

Examples include intelligent tutoring systems that provide step-by-step guidance and immediate feedback. This approach enhances understanding and reduces learning gaps.

4.2 Intelligent Tutoring Systems (ITS)

Intelligent Tutoring Systems simulate one-to-one human tutoring. They provide:

- Personalized instruction
- Immediate feedback
- Diagnostic assessment
- Remedial support

ITS are particularly useful in subjects like mathematics, science, and language learning, where practice and feedback are essential.

4.3 Automated Assessment and Evaluation

AI enables automated grading of objective tests, assignments, and even subjective answers using NLP and machine learning. It reduces teachers' workload and ensures faster feedback to students.

AI-based assessment tools can:

- Analyze student responses
- Identify misconceptions
- Track progress over time
- Support formative and summative assessment
- This promotes continuous evaluation rather than exam-oriented learning.

4.4 Learning Analytics and Prediction

Learning analytics use AI to analyze student data such as attendance, participation, test scores, and online activity. These systems can predict:

Academic performance

Risk of dropout

Learning difficulties

Early identification allows timely intervention by teachers and institutions, improving student retention and success rates.

4.5 AI Chatbots and Virtual Assistants

AI-powered chatbots act as virtual teaching assistants. They provide:

- 24/7 academic support
- Answers to frequently asked questions
- Guidance on assignments and deadlines

- Chatbots promote self-directed learning and reduce dependency on teachers for routine queries.

4.6 Support for Inclusive Education

AI plays a crucial role in inclusive education by supporting learners with special needs. Examples include:

- Speech-to-text and text-to-speech tools
- AI-based translation for multilingual learners
- Assistive technologies for visually or hearing-impaired students

Thus, AI helps in creating equitable learning opportunities.

4.7 Administrative and Institutional Management

AI is not limited to classroom teaching; it also improves administrative efficiency. AI systems assist in:

- Admission processes
- Timetable scheduling
- Resource management
- Attendance tracking

This reduces manual workload and improves institutional decision-making.

5. ROLE OF TEACHERS IN AI-ENABLED EDUCATION

AI does not replace teachers; rather, it redefines their role. Teachers shift from being information providers to:

- Facilitators of learning
- Mentors and guides
- Designers of learning experiences
- Emotional and ethical supporters
- AI handles routine and repetitive tasks, allowing teachers to focus on higher-order teaching functions such as critical thinking, creativity, and value education.
- Teacher training and digital competence are essential for effective AI integration.

6. BENEFITS OF ARTIFICIAL INTELLIGENCE IN EDUCATION

The major benefits of AI in education include:

- Personalized learning experiences
- Improved learning outcomes
- Immediate feedback and support
- Reduced teacher workload
- Data-driven educational planning
- Enhanced student engagement
- Support for lifelong learning
- Inclusive and accessible education
- AI enables education systems to become more responsive, flexible, and learner-centered.
- AI is being implemented in education around the world in many different ways — from curriculum changes and classroom tools to national strategies and public-private partnerships.

Here's a global overview of how various countries and regions are using AI in education:

1. NATIONAL CURRICULA & POLICY-LEVEL INTEGRATION

China

China is integrating AI into its national school curriculum. AI education is becoming mandatory in primary and secondary schools, with students learning basics like robotics, algorithmic thinking and machine learning early on. Pilot programs and AI education bases are being created to standardize best practices.

South Korea

South Korea is one of the most advanced nations in AI in education. It has introduced AI-powered digital textbooks with adaptive learning and real-time feedback and established “AI Education Research Schools” to test tools and teacher training. AI is also a formal subject in many schools.

United Arab Emirates (UAE)

The UAE is making AI education comprehensive and early. AI is being introduced as part of the school curriculum from kindergarten through Grade 12, emphasizing both technical skills and ethics.

India

India is steadily integrating AI into schools. Boards like CBSE have introduced AI as an elective subject, and national initiatives aim to expand AI literacy and use adaptive tools to support learning.

Australia

Australia has developed a national framework for AI in schools focused on responsible and transparent use, with pilots rolling out across states.

Estonia

Estonia plans to give students and teachers AI accounts and integrate AI tools into everyday learning through its “AI Leap” initiative, supporting digital fluency across ages.

2. PERSONALIZED LEARNING & CLASSROOM TOOLS**United States**

AI is widely used to personalize learning through platforms like adaptive learning systems that adjust lessons to student performance, and automated grading systems that free up teacher time.

Singapore

Singapore uses AI to tailor student learning experiences and also invests heavily in teacher training so educators fully understand how to use the technology.

Finland

Finland is known for accessible AI education, including the “Elements of AI” course that promotes AI understanding for teachers and citizens, plus tools that support personalized learning.

3. REGIONAL & DEVELOPMENT CONTEXTS**Kenya**

In Kenya, AI education is often delivered through mobile platforms that tailor learning to student needs via SMS or chat interfaces — increasing access in rural areas.

Rwanda & GH Ghana

Rwanda focuses on teacher training and curriculum enhancement, while Ghana uses AI to support special education and career-oriented learning.

4. EDUCATION TOOLS & USES

Across many countries, AI is used for:

- Adaptive learning systems that personalize content to the learner’s pace.
- Automated tutoring and feedback, helping students learn outside class time.
- Teacher support — grading, scheduling, content creation and early detection of learning gaps.
- Ethical awareness and AI literacy so students understand not just how to use AI but its social impacts.

5. USAGE & ADOPTION TRENDS

In Europe, teacher use of AI varies widely — from about 14 % in some countries to over 50 % in others — reflecting different levels of investment and tools availability.

Market reports show a leading global share of AI in education in countries like the USA, China, UK, India and Germany.

Key Themes in Global AI Education

- Curriculum integration (compulsory AI subjects in schools)
- Teacher training and literacy
- Personalized learning via adaptive AI tools
- National strategies linking education to future workforce needs
- Disparities in access, highlighting the need for equitable implementation

7.1 Ethical Issues and Data Privacy

AI systems rely on large amounts of student data. Issues related to data privacy, consent, and security are major concerns. Misuse of data can harm learners' rights.

7.2 Algorithmic Bias

AI systems may reflect biases present in data, leading to unfair outcomes. Bias in assessment or prediction can disadvantage certain groups of students.

7.3 Digital Divide

Access to AI-based tools requires infrastructure, internet connectivity, and digital literacy. Students from disadvantaged backgrounds may be excluded, increasing inequality.

7.4 Overdependence on Technology

Excessive reliance on AI may reduce human interaction, emotional development, and social learning. Education must balance technology with human values.

7.5 Teacher Resistance and Training Issues

Lack of awareness, training, and fear of technology can hinder AI adoption. Continuous professional development is essential.

8. AI IN EDUCATION AND NEP 2020 (INDIAN CONTEXT)

In the Indian context, the National Education Policy (NEP) 2020 emphasizes the integration of technology, AI, and digital tools in education. It promotes:

- Experiential and personalized learning
- Use of educational technology platforms
- Teacher training in emerging technologies
- Equitable access to digital education
- Initiatives like DIKSHA, SWAYAM, and AI-based EdTech platforms reflect India's commitment to AI-enabled education.

The future of AI in education is not about replacing teachers, but about transforming teaching–learning into a more personalized, inclusive, and efficient process. From a teacher-education and school-education perspective, the future can be understood under the following key dimensions:

1. Personalized and Adaptive Learning

AI will increasingly:

- Analyze students' learning pace, strengths, and weaknesses
- Provide customized learning paths for each learner
- Offer remedial support for slow learners and enrichment for gifted students
- One classroom, many learning levels—AI makes this practical.

2. Teacher as Facilitator, Not Replaced

In the future:

- AI will handle routine tasks (attendance, grading, progress reports)
- Teachers will focus on guidance, mentoring, emotional support, and value education

-
- Lesson planning will be AI-assisted, not AI-controlled
 - Teacher's role becomes more human, creative, and reflective.

3. Intelligent Assessment and Evaluation

AI will bring:

- Continuous and formative assessment instead of only exams
- Automatic analysis of learning outcomes (cognitive, affective, psychomotor)
- Early identification of learning difficulties, stress, or dropout risk
- Assessment becomes diagnostic and supportive, not only judgmental.

4. Inclusive and Special Education Support

AI will strongly support:

- Students with disabilities (speech-to-text, text-to-speech, visual aids)
- Personalized interventions for ADHD, dyslexia, autism spectrum learners
- Multilingual learning support for diverse classrooms
- Education becomes more equitable and inclusive.

5. AI Literacy as a Core Life Skill

Future education systems will:

- Teach AI literacy, ethics, and responsible use
- Develop critical thinking about AI outputs
- Prepare students for AI-driven careers
- Students learn not just to use AI, but to question and guide it.

6. Smart Content Creation and Digital Classrooms

AI will help in:

- Creating interactive textbooks and simulations
- Virtual labs, AR/VR learning experiences
- Real-time feedback during online and blended learning
- Learning becomes experiential and engaging.

7. Data-Driven Educational Planning

At institutional and policy levels:

- AI will support curriculum design and revision
- Help governments track learning outcomes at scale
- Improve teacher training programs based on real classroom data
- Educational decisions become evidence-based.

8. Ethical and Human Concerns

- The future will also require:
- Strong policies on data privacy and bias
- Clear limits on AI use in exams and assignments
- Balance between technology and human values
- Ethics will be as important as innovation.

In Simple Words:

The future of AI in education =

Smarter systems + empowered teachers + personalized learners + ethical use

AI will support, enhance, and humanize education—if implemented thoughtfully.

10. CONCLUSION

Artificial Intelligence has the potential to revolutionize education by making learning more personalized, inclusive, efficient, and data-driven. AI supports students, empowers teachers, and strengthens educational institutions. However, it should be viewed as a supportive tool rather than a replacement for human educators. Successful integration of AI in education requires careful planning, ethical considerations, teacher training, and equitable access. When used responsibly, AI can contribute significantly to the development of a learner-centered education system that prepares students for the challenges of the future.

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INVESTMENT STRATEGIES FOR RETAIL INVESTORS

Dipika Satnathi

Seva Sadan College of Arts, Science and Commerce

ABSTRACT

This paper discussed the strategies adopt by Retail investor for taking a decision regarding investments in all investment avenues. It is found from the study that the information on all investment avenues required good analysis skills on risk and return aspect. Retail investors adopt the simple and less time consuming strategies for investments for good returns.

An investment involves allocation of funds to an asset with the aim of achieving financial benefits through value appreciation or income generation with effective calculation of risk associated in that avenue. Options for investing include the Mutual funds, stock market, derivatives, real estate, gold, government securities, currencies, commodities etc.

Key words: *Investment, Investment Avenue, Strategies for investment.*

INTRODUCTION

Investment is a fundamental component of financial planning and economic development. It involves the allocation of financial resources into various assets with the objective of generating income, capital appreciation, or both over a period of time. In today's dynamic financial environment, individuals are increasingly recognizing the importance of investing rather than merely saving. While saving ensures financial security, investment enables wealth creation and protection against inflation.

The modern financial system offers a wide range of investment avenues, each with distinct characteristics in terms of risk, return, liquidity, safety, and tax implications. These avenues include traditional options such as fixed deposits, gold, and real estate, as well as market-linked instruments like equity shares, mutual funds, bonds, derivatives, and alternative investments. The selection of an appropriate investment avenue depends on multiple factors including the investor's financial goals, income level, risk tolerance, time horizon, and market conditions.

However, investment decisions are often influenced by uncertainty and market volatility. Economic factors such as inflation, interest rates, government policies, global events, and geopolitical risks directly impact asset performance. Therefore, merely selecting an investment avenue is not sufficient; investors must adopt appropriate investment strategies to manage risk and achieve desired returns. Strategic approaches such as diversification, asset allocation, growth investing, value investing, income investing, and hedging help in balancing risk and reward.

This research paper aims to study various investment avenues and analyse the strategies associated with them. It explores how investors can construct balanced portfolios by combining different assets according to their financial goals and risk preferences. The study also emphasizes the importance of disciplined investing, regular monitoring, and informed decision-making in achieving sustainable financial growth.

In a rapidly evolving financial environment, knowledge of investment avenues and strategies is no longer optional but necessary. Sound investment decisions not only enhance individual financial well-being but also contribute to overall economic development by channelling savings into productive sectors of the economy.

OBJECTIVES OF THE STUDY

1. To examine the various investing options accessible to investors.
2. To research other approaches to investing in these areas.
3. To investigate how various investment options relate to risk and return.
4. To comprehend how diversification enhances the performance of a portfolio.

SCOPE OF THE STUDY

The present study focuses on analysing various investment avenues and the strategies adopted by investors to optimize returns while managing risk. The research covers major traditional and modern investment options available to individual investors, particularly in the Indian financial context.

The study includes investment avenues such as equity shares, debt instruments, mutual funds, real estate, gold, derivatives, and alternative investments. It examines the characteristics, risk-return profiles, liquidity aspects, and suitability of each avenue for different categories of investors.

The research also explores different investment strategies including growth investing, value investing, income investing, diversification, asset allocation, systematic investment plans (SIP), and hedging strategies. It aims to understand how these strategies help in portfolio management and long-term wealth creation.

The scope of the study is limited to secondary data collected from books, research journals, financial reports, and official publications from institutions such as RBI and SEBI. It does not involve primary data collection such as surveys or interviews.

The study primarily focuses on individual investors and does not extensively cover institutional investment strategies. Additionally, while global investment concepts are discussed, the primary emphasis is on the Indian financial market. Overall, the study seeks to provide a comprehensive understanding of investment avenues and their related strategies to help investors make informed financial decisions.

REVIEW OF LITERATURE

The 2008 global financial crisis, several studies examined portfolio resilience and risk management. Baur and Lucey (2010) found that gold acts as a hedge and safe-haven asset during market turmoil, reinforcing its importance as a diversification tool within multi-asset portfolios. Similarly, Hoesli and Reka (2013) observed that real estate investments provide portfolio stability and inflation protection when combined with financial assets.

Singh and Jha (2009) found that investors prefer a mix of safety and return, often balancing fixed-income instruments with equity investments. More recent studies indicate that the growth of mutual funds and digital investment platforms has increased retail participation in capital markets, encouraging diversified investment strategies.

Statman (2014) emphasized that modern investors seek not only financial returns but also behavioral satisfaction and perceived security. This has led to the rise of alternative investments and diversified portfolio approaches to manage both financial and psychological risk.

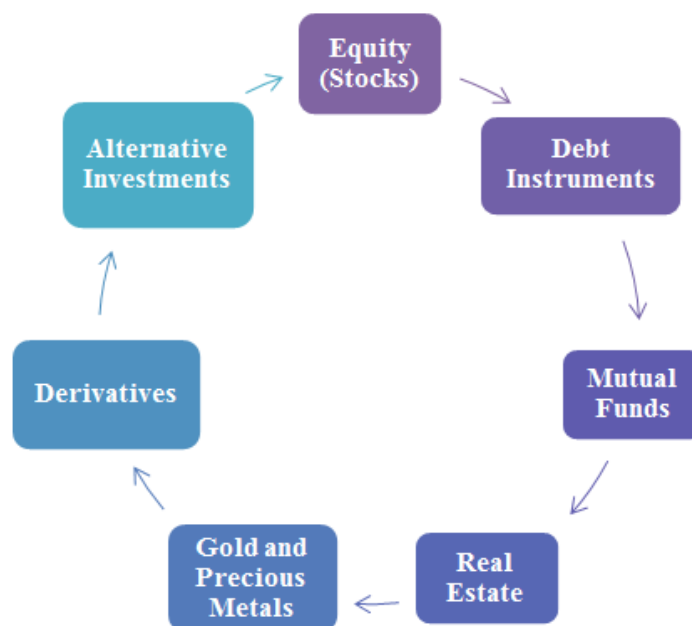
Although extensive research exists on individual asset classes and specific strategies, there remains limited integrative analysis that collectively examines multiple investment avenues and aligns them with corresponding strategic approaches under a unified framework. Therefore, the present study aims to bridge this gap by analyzing investment avenues alongside strategic models to provide a comprehensive understanding suitable for contemporary investors in a dynamic financial environment.

RESEARCH METHODOLOGY

This research paper is based on secondary data, including:

1. Books on financial management
2. RBI and SEBI reports
3. Research journals
4. Financial websites and publications

INVESTMENT AVENUE

**INVESTMENT STRATEGIES****Growth Investment Strategy**

The growth strategy focuses on investing in companies that are expected to expand at a faster rate compared to the overall market. These companies typically reinvest profits to fuel expansion rather than distributing dividends.

Growth investing aims at capital appreciation over the long term. Investors following this strategy accept higher volatility and short-term fluctuations in exchange for potential long-term gains. This strategy is most suitable for aggressive investors with a long investment horizon.

Value Investment Strategy

The value investment strategy involves selecting securities that appear undervalued based on fundamental analysis. Investors analyze financial statements, earnings potential, price-to-earnings ratios, and intrinsic value to identify stocks trading below their true worth.

The core idea behind this strategy is that markets sometimes misprice assets due to temporary factors. When the market corrects itself, the price of undervalued assets rises, generating returns. This approach is suitable for investors who prefer analytical decision-making and moderate risk exposure.

Income Investment Strategy

The income strategy focuses on generating regular and stable income from investments. It includes assets such as dividend-paying stocks, bonds, fixed deposits, and real estate generating rental income.

This strategy prioritizes cash flow over capital appreciation and is commonly adopted by conservative investors, retirees, or individuals seeking financial stability. Risk is generally lower compared to growth-oriented strategies.

Diversification Strategy

Diversification involves spreading investments across different asset classes, industries, or geographic regions to reduce risk. The main objective is to minimize unsystematic risk by ensuring that poor performance in one asset does not significantly impact the overall portfolio.

For example, a diversified portfolio may include equity, debt instruments, gold, and real estate. Diversification improves the stability of returns and enhances long-term portfolio performance.

ASSET ALLOCATION STRATEGY

Asset allocation refers to distributing investments among different asset categories such as equity, debt, and alternative investments based on the investor's age, financial goals, and risk profile.

Strategic asset allocation focuses on long-term target allocation, while tactical asset allocation involves short-term adjustments based on market conditions. Research suggests that asset allocation plays a more significant role in portfolio performance than individual security selection.

Systematic Investment Strategy (SIP Approach)

A systematic investment strategy involves investing a fixed amount at regular intervals. This method reduces the impact of market volatility by averaging the purchase cost over time.

It promotes financial discipline and eliminates the need for market timing. This strategy is especially beneficial for small investors and salaried individuals aiming for long-term wealth accumulation.

Hedging Strategy

Hedging is a risk management strategy used to protect investments from adverse market movements. It involves using financial instruments such as options, futures, or diversification into negatively correlated assets.

Although hedging reduces potential losses, it may also limit potential gains. Therefore, it is mainly adopted by experienced investors and institutional participants.

Passive vs Active Investment Strategy

An active strategy involves frequent buying and selling of securities to outperform the market through research and analysis. In contrast, a passive strategy aims to replicate market performance by investing in index funds or exchange-traded funds.

Passive strategies typically involve lower costs and lower risk, whereas active strategies aim for higher returns but involve higher transaction costs and market risk.

CONCLUSION OF STRATEGY SECTION

Investment strategies are essential tools that guide investors in selecting suitable investment avenues. The effectiveness of a strategy depends on alignment with financial objectives, risk appetite, and market conditions. A combination of diversification, disciplined investing, and strategic asset allocation generally leads to better long-term portfolio performance.

RISK & RETURN ANALYSIS

Investment Avenue	Risk Level	Return Potential	Liquidity
Equity	High	High	High
Debt	Low	Moderate	Moderate
Mutual Funds	Moderate	Moderate to High	High
Real Estate	Moderate	High	Low
Gold	Low to Moderate	Moderate	High
Derivatives	Very High	Very High	High

FACTORS INFLUENCING INVESTMENT DECISION

1. Risk tolerance
2. Investment horizon
3. Income level
4. Tax considerations
5. Economic conditions
6. Inflation
7. Interest rates

FINDINGS

1. Equity provides higher long-term returns but involves higher volatility.
2. Debt instruments ensure stability and income security.
3. Diversification significantly reduces unsystematic risk.
4. SIP is effective for small and retail investors.
5. Asset allocation is key to balanced portfolio management.

CONCLUSION

Investment strategies vary according to financial goals and risk appetite. No single investment avenue is ideal for all investors. A combination of different investment avenues through diversification and strategic asset allocation helps in maximizing returns and minimizing risks.

Investors should adopt disciplined and long-term investment approaches supported by continuous monitoring and periodic portfolio rebalancing.

SUGGESTIONS

- Investors should define clear financial goals.
- Avoid emotional investing.
- Regularly review portfolio performance.
- Increase financial literacy.
- Consider professional financial advice when necessary.

REFERENCES

- Prasanna Chandra – Investment Analysis and Portfolio Management
- SEBI Reports
- RBI Publications
- NSE & BSE official websites
- Economic Times – Investment section

APPLICATIONS OF ZHOU'S DIFFERENTIAL TRANSFORM METHOD BY FIRST ORDER DIFFERENTIAL EQUATION OF REAL WORLD SYSTEMS

¹Bhagyashree A.Narkhede, ²Dr. Rajkumar P.Narkhede and ³Dr.Narhari O. Warade

¹Professor, Dr. V.B.Kolte College Of Engineering, Malkapur

²Konkan Gyanpeeth College of Engineering, Karjat

³Mahatma Gandhi Mission's College of Technogy Kamothe Navi Mumbai

ABSTRACT

The scope of present paper for solving cooling law, population growth and decay, Radio Active Decay, Mixture of two salt solutions, Electrical Series Problems, Survivability with AIDS, Economics and Finance, Harvesting of Renewable Natural Resources by Zhou's differential transform method for finding analytical series solution of first order differential equations initial value problems.

In this research work how ZDTM is applicable for Health care Drug distribution in Human Body, Administration by Mathematics Police women and population growth and Decay Problems.

Keywords: Ordinary differential equations of first order, Homogeneous, Nonhomogeneous, IVP, ZDTM.

1.0 INTRODUCTION

The fundamental base of ZDTM is based on the Tayler's series. A large verity of methods such as exact, Laplace transform, Numerical method are also available for solving the differential equations. This method sure really cumbersome as it requires intensive linearization computationally and lot of trial and error method requires lot of symbolic representation.

Zhou has suggest technique for solving differential equations. This technique was used for solving linear and nonlinear initial value problem in electrical circuits, Later this concept may be applied to science, economics, management, which transfer transform the equation to second order linear differential equations.

Application of Zhou's Differential Transform method to Mechanical Engineering for damped motion of spring.

Opanaga (2014) used ZDTM for solving numerical solution of systems of ordinary differential equation by numerical analytical method [1], Biazar (2010) J. et. Al used ZDTM for solving quadratic Riccati differential equation [2], Chen (2004) used ZDTM to obtained solution of non linear system of differential equations [3], Zhou (1986) applied ZDTM for solving electrical circuits problems [4], Ayaz (2004) used ZDTM to find series solution of system of differential equations [5], Zeng (2004) has applied ZDTM on system linear equation and analysis of its solutions[7], Dunn and Jain (2008) used ZDTM to evaluate Burger's equation to obtain series solutions [6], Chen and Liu (1998) has applied ZDTM for steady nonlinear beat conduction problems [8], Hasan (2008) have find out series solution and that solution compared with ZDTM method for linear and non-linear initial value problems and proved that ZDTM is reliable tool to find numerical solution [9], Batiha (2011) has used ZDTM to obtained the Taylor's series as solution of linear, non linear system of ordinary differential equations [10], Thangmoon (2010) has used ZDTM to find numerical solution of ordinary differential equations [11], Edeki et.al (2014) has used this method to evaluate solution of second order ordinary differential equations

2.0 DEFINATION OF ZDTM

An arbitrary function $g(+)$ can be expanded in Taylor series about $t = 0$

$$h(m) = \sum_{k=0}^{\infty} \frac{m^k}{k!} \left[\frac{d^k g}{dt^k} \right]_{k=0}$$

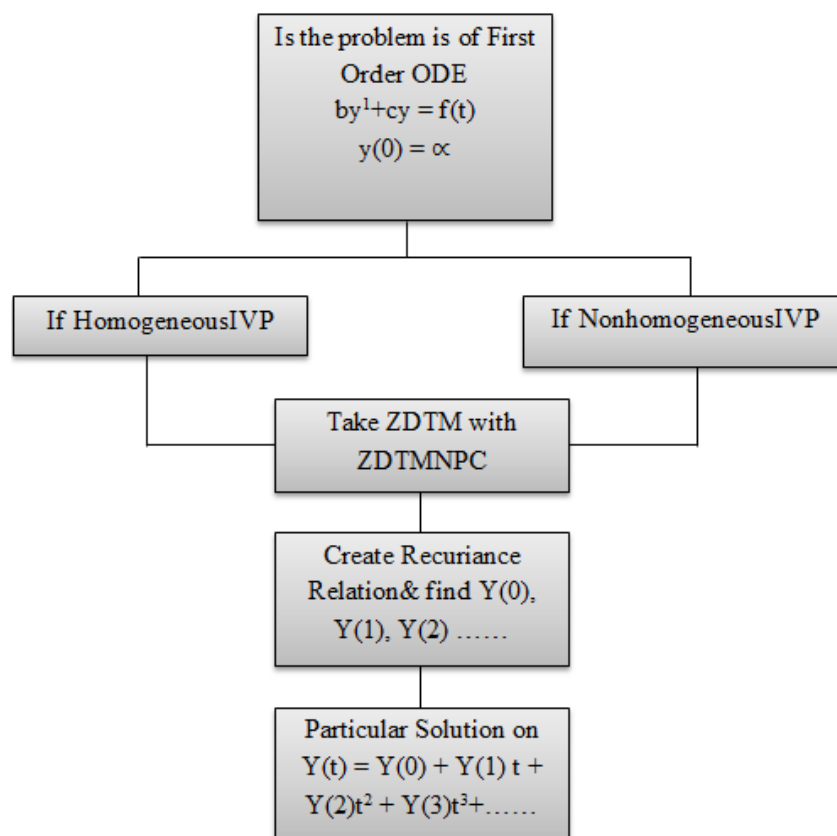
$$ZDT [h(t)] = H(k) = \frac{1}{k!} \left[\frac{d^k h(t)}{dt^k} \right]_{k=0}$$

3.0 A) THEOREMS ON DTM METHOD

Original Function	Transformation
1) $g(t) = x(t) + y(t)$	$G(k) = X(k) + Y(k)$
2) $g(t) = \alpha X(t)$	$G(k) = \alpha X(k)$
3) $g(t) = \frac{d}{dt} X(t)$	$G(k) = (k+1) X(k+1)$

4)	$g(t) = \frac{d^n}{dt^n} X(t)$	$G(k) = (k+1)(k+2) \dots (k+n) X(k+n)$
5)	$g(t) = t^n G(k)$	$= \delta(k-n)$
	$= 1 - k = n$	
	$= 0 - k \neq n$	
6)	$g(t) = e^{\lambda t}$	$G(k) = \frac{\lambda^k}{k!}$
7)	$g(t) = \sin(\alpha t + \beta)$	$G(k) = \frac{\alpha^k}{k!} \sin\left(\frac{k\pi}{2} + \beta\right)$
8)	$g(t) = \cos(\alpha t + \beta)$	$G(k) = \frac{\alpha^k}{k!} \cos\left(\frac{k\pi}{2} + \beta\right)$
9)	$g(t) = x(t) \cdot y(t)$	$G(k) = \sum_{m=0}^K Y(n) (k-n)$
10)	$g(t) = (1+t)^n$	$G(k) = \frac{n(n-1) \dots (n-k+1)}{K!}$

4.0 FLOW CHART OF SECOND ORDER LINEAR DIFFERENTIAL EQUATION BY ZDTM



5.0 EXPERIMENTATION OF ZDTM RESULTS

Example: 1 Population Growth and Decay

It was estimated that earth's human population in 1996 was 3,030,000,000. Assuming the population increases at the rate of 2 percent find the earth's population in 1996 using model of population growth (1.8). Check this number with the actual population of the earth available from authentic source.

Ans : $\frac{dp}{dt} = kp$

$$\int \frac{dp}{p} = \int k dt$$

$\log p = kt + c$

$p = e^{kt} \cdot e^c$

$$p = \alpha \cdot e^{kt}$$

$$p(t) = \alpha e^{kt}$$

$$t = 0$$

$$p(0) = \alpha$$

$$\frac{dp}{dt} = \frac{-2}{100} P$$

$$\frac{dp}{dt} = 0.02P$$

$$p(t) = \alpha e^{0.024}$$

$$p(0) = 306 \text{ crores}$$

$$p(t) = 306 e^{0.024}$$

$$\text{put } t = 35$$

$$p(35) = 306 e^{0.02 \times 35}$$

$$p(35) = 616.2083285 \text{ crores}$$

By ZDTM

$$(k+1) P(k+1) - 0.02p(k)$$

$$k = 0, 1, 2, 3, \dots$$

$$k = 0$$

$$p(1) = 0.02p(0)$$

$$k = 1$$

$$\lambda p(2) = 0.02p(1)$$

$$p(2) = \frac{1}{2} (0.02) (0.02) p(0)$$

$$= \frac{1}{2!} (0.02)^2 p(0)$$

$$p(3) = \frac{1}{3!} (0.02) (0.02) p(0)$$

$$\therefore p(t) = p(0) + t p(1) + t^2 p(2) + \dots$$

$$= p(0) + t(0.02) p(0) + \frac{t^2}{2!} (0.02)^2 p(0) + \frac{t^3}{3!} (0.02)^3 p(0)$$

$$p(t) = p(0) \left[1 + (0.02)t + \frac{(0.02)^2}{2!} t^2 + \frac{(0.02)^3}{3!} t^3 + \dots \right]$$

$$t = 35 \quad \text{i.e.}$$

$$p(t) = 306 [e^{0.02t}]$$

$$t = 35 [e^{0.02 \times 35}]$$

$$p(35) = 616.2083285 \text{ crores}$$

Example 2: Mathematic of police women

The time of death of a murdered person is to be determined. A police personnel discovers the body of a dead person presumably murdered and the body is located in room that is kept at a consistent 60°F. For same time after the deaths the time after the death, the body will radiate heat into room, causing the body's temp to decrease assuming that the victim temperature was normal i.e. 98.6 F at time of death.

Solution: According to Newton's law of cooling, this body will radiate heat energy into the room at a rate proportional to the difference in temp between the body and room. If $T(t)$ is the body temp at time t , then for some constant of proportionality k ,

$$T'(t) = k[T(t) - 60]$$

This is separable difference equation

$$\frac{1}{T-60} dT = K dt$$

$$\ln |T - 60| = Kt + c$$

$$|T - 60| = e^{Kt + c} = Ae^{Kt}$$

Where $A = e^c$ Then

$$T - 60 = \pm Ae^{Kt} = Be^{Kt}$$

$$T(t) = 60 + Be^{Kt}$$

The police arrived at 9:40 pm and the body temp was 84.4°F. This means that of officer considers 9:40 pm, $t = 0$ then

$$T(0) = 84.4 = 60 + B$$

$$\therefore B = 24.4$$

$$T(t) = 60 + 24.4 e^{Kt}$$

Another measurement was made at 11:10 pm and the temp is 79°F

$$\therefore T(90) = 79 = 60 + 24.4 e^{90K}$$

Then,

$$e^{90K} = \frac{19}{24.4}$$

So,

$$90 K = \log_e \left(\frac{19}{24.4} \right)$$

$$K = \frac{1}{90} \times \ln \left(\frac{19}{24.4} \right)$$

The officer has now temp function

$$T(t) = 60 + 24.4 e^{\frac{t}{90} \ln \left(\frac{19}{24.4} \right)}$$

$$\therefore \frac{98.6 - 60}{24.4} = e^{\frac{t}{90} \ln \left(\frac{19}{24.4} \right)}$$

$$\log_e (1.581) = \frac{t}{90} \ln \left(\frac{19}{24.4} \right)$$

$$t = 90 \frac{\ln(1.581)}{\ln \left(\frac{19}{24.4} \right)}$$

$$t = -164.80 \text{ min}$$

$\therefore$ The death occur approx 164.8 min before 09:40 pm time of death is 06:55 pm

By ZDTM method

$$T' = [T-60]$$

$$(k+1) T(k+1) = \alpha [T(k) - 60 \delta(k-0)]$$

Put $k=0,1,2,3,\dots$

$$k = 0$$

$$T(1) = \alpha [T(0) - 60]$$

$$T(0) = 84.4, \alpha = \frac{1}{90} \ln \left(\frac{19}{24.4} \right)$$

$$T(1) = \frac{1}{90} \ln \left(\frac{19}{24.4} \right) [84.4 - 60]$$

$$= \frac{1}{90} \ln \left(\frac{19}{24.4} \right) [24.4] = B$$

$$k = 1$$

$$2T(2) = \alpha [T(1) - 0]$$

$$T(2) = \frac{\alpha}{2} T(1) = \frac{\alpha}{2} \cdot \beta$$

$$k = 2$$

$$3T(3) = \alpha T(2)$$

$$T(3) = \frac{\alpha}{3} T(2) = \frac{\alpha}{3} \cdot \frac{\alpha}{2} \cdot \beta = \frac{\alpha^2}{3!} \cdot \beta$$

$$k = 3$$

$$4T(3) = \alpha T(3)$$

$$T(4) = \frac{\alpha}{4} T(3) = \frac{\alpha^3}{4!} \cdot \beta$$

$$\therefore T(4) = T(0) + T(1) t + T(2) t^2 + \dots$$

$$= T(0) + t \cdot \beta + t^2 \cdot \frac{\alpha}{2} \beta + t^3 \cdot \frac{\alpha^2}{3!} \beta + t^4 \cdot \frac{\alpha^3}{4!} \beta + \dots$$

$$T(4) = T(0) + \beta \left(t + \frac{t^2}{2!} + \frac{t^3}{3!} + \dots \right) T(0) + \beta (e^t - 1)$$

When

$$T(t) = 98.60$$

$$t = -164.80 \text{ mi}$$

The death occurs approx 164.8 min before 9:40 pm i.e. 6:55 pm

Example 3: Economics and Finance

If is given that interest is compounded continuously, the principal changes at the rate equal to the product of the rate of bank interest per annum and the principal. If the interest is compounded at 5% per annum. How many years 100 Rs will be double?

Exact solution is 13.862 year

By ZDTM Solution

$$(k+1) P^* (k+1) = \frac{5}{100} P^* (k)$$

$$k = 0, 1, 2, 3, 4, \dots$$

$$P^* (1) = \frac{5}{100} P^* (0) = \frac{5}{100} \times 100 = 5$$

$$P^* (2) = \frac{25}{200}$$

$$P^* (3) = \frac{125}{60000}$$

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$$p^*(t) = P^* (0) + t P^* (1) + t^2 P^* (2) + \dots$$

$$= 100 + 5 t + \frac{25}{200} t^2 + \frac{125}{60000} t^3 + \dots$$

$$\text{at } t = 13.862, P^* = 200$$

if $P^* = 1000$ after 10 Year $D = 1648$

6.0 VALIDATION AND COMPARISON

Cooling law problems, Population Growth Problems, Economics and Finance Problems can be called by ZDTM method which reduces computational work then other method. In all of the above three problems are taken for comparison and it is found that ZDTM gives same solution as similar to the exact solution with zero error.

7.0 CONCLUSION

In all of the higher than 3 quoted examples, resolution the answer obtained by ZDTM is strictly same as that of the precise solution technique. thus it is depicted that ZDTM is additionally reliable technique to resolve the matter. This technique reduces giant machine work. The accuracy of the series is extremely high as compared to precise answer. Show that ZDTM is extremely powerful analytical series answer technique.

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A STUDY ON STRATEGIES FOR DAY TRADING W.R.T VWAP

Hema A. Chetwani

Assistant Professor, Seva Sadan College of Arts, Science & Commerce, Ulhasnagar

ABSTRACT

*Intraday trading involves purchasing and selling stocks within the same trading day, aiming to profit from short-term price fluctuations before the market closes. Compared to long-term investing, intraday trading is riskier, particularly for beginners. However, with proper knowledge and risk management, it offers potential profits. Key skills like technical analysis, risk management, and understanding market patterns are crucial for successful intraday trading. One important indicator for intraday traders is the **Volume Weighted Average Price (VWAP)**, which calculates the average price of a stock based on trading volume.*

Keywords: VWAP strategy, Intraday Trading Rules

INTRODUCTION

Volume Weighted Average Price (VWAP) is a significant intraday technical indicator used to represent the average price a security has traded at throughout the day. It is calculated by dividing the total dollar value of trades by the total volume. VWAP provides a benchmark to determine intraday market sentiment: prices above VWAP indicate bullish conditions, while prices below VWAP indicate bearish conditions.

REVIEW OF LITERATURE

- **Abd hul Rahim (2013):** Discusses SEBI and NSE's role in regulating online stock trading in India and emphasizes the benefits of long-term equity investing.
- **Petric Loana Ancuta (2015):** Highlights the growing attraction of online trading platforms and the factors influencing investors' transition to online trading.
- **Dr. Sarika Srivastava (2016):** Analyzes the impact of internet growth on online trading in India, eliminating geographical barriers, and increasing financial awareness.
- **Professor Aadil Bade (2017):** Focuses on the growth of online trading and the state of Demat accounts in India, noting that online trading is still in its early stages.

RESEARCH METHODOLOGY

The data used in this research was sourced entirely from secondary sources, including online databases, archived charts, and day-to-day market activity analysis.

OBJECTIVES

1. To study the VWAP strategy and its application, including entry and exit points.
2. To examine the basic intraday rules to be followed by traders.

KEY ASPECTS OF VWAP

- **Weighted Data:** Unlike simple moving averages, VWAP gives more weight to price levels with higher trading volume, offering a more accurate representation of the average price.
- **Intraday Reset:** VWAP resets at the beginning of each trading session.

• **Formula:**

$$VWAP = \frac{\sum(\text{Typical Price} \times \text{Volume})}{\sum(\text{Volume})}$$

- **Usage:** VWAP is used to identify trends, set entry/exit points, and minimize market impact for institutional traders.

○ **Simple Explanation:**

VWAP is the price level at which most money has been traded during the day.

- **Institutional Traders' Strategy:**
- Good buy: Price below VWAP
- Good sell: Price above VWAP

SIMPLE STOCK MARKET EXAMPLE

Imagine a stock trading as follows throughout the day:

Time	Price (₹)	Volume
9:30 AM	100	200
10:00 AM	102	300
10:30 AM	101	500
11:00 AM	103	400

Step 1: Price × Volume

Price	Volume	Price × Volume
100	200	20,000
102	300	30,600
101	500	50,500
103	400	41,200

Step 2: Add Them Up

- Total (Price×Volume) = 142,300
- Total Volume = 1,400

Step 3: Calculate VWAP

VWAP=142,300/1,400=₹101.64

HOW TRADERS USE VWAP

- **Trend Identification:**
 - A price consistently above VWAP indicates a bullish trend. If the price is below VWAP, it suggests a bearish trend.
- **Support/Resistance:**
 - VWAP acts as a dynamic support or resistance level, where prices may bounce or reverse.
- **Reversion/Breakout:**
 - Traders look for situations where:
 - **VWAP Reclaim:** Price moves above VWAP after previously being below.
 - **VWAP Breakout:** Price rises significantly above VWAP, especially with high volume.

Example:

- If the current price = ₹100
 - Below VWAP → Bullish bias (Price is cheaper than average)
- If the current price = ₹104
 - Above VWAP → Bearish bias (Price is expensive relative to average)

KEY VWAP RULES

- VWAP resets at the start of each trading day.
- Best used for intraday trading, not for long-term investments.
- Functions as a reliable support and resistance level.
- Best when combined with price action and volume.

GOLDEN RULE OF VWAP

- **Trade in the direction of VWAP bias**
 - Price above VWAP → Bullish bias
 - Price below VWAP → Bearish bias
 - Price near VWAP → Avoid trades (Choppy zone)

VWAP STRATEGIES FOR INTRADAY TRADING

Strategy	Strategy 1: Vwap Pullback (Most Reliable)	Strategy 2: Vwap Rejection (Reversal)	Strategy 3: Vwap Breakout (High Volume Only)
Setup (BUY)	1. Market opens strong 2. Price stays above VWAP 3. Pullback comes near VWAP 4. Bullish candle forms (engulfing / hammer)	1. Price is below VWAP 2. Price pulls up to VWAP 3. VWAP acts as resistance 4. Bearish candle forms	1. Price consolidates below VWAP 2. Sudden high-volume breakout above VWAP 3. Candle closes above VWAP
Entry	• Buy above the bullish candle high	• Sell below bearish candle low	• Buy on retest of VWAP
Stop Loss	• Below VWAP or recent swing low	• Above VWAP	• Below VWAP
Target	• Previous high • Or 1:2 Risk-Reward • Or trail using 9/20 EMA	• Day low • Or next support zone	• Intraday resistance • Or measured move
Best Time	9:30–11:30 AM	Works best in weak / trending markets	Avoid fake breakouts with low volume

COMMON VWAP MISTAKES

- Trading when the price crosses VWAP multiple times without clear direction.
- Using VWAP in sideways or range-bound markets.
- Ignoring volume confirmation.
- Entering trades too late after significant price movements.

PRO TIPS

- VWAP works best with high-volume, liquid stocks or indices.
- Avoid trading in the first 5–10 minutes, when VWAP readings are often unreliable.
- Limit yourself to 1–2 VWAP trades per day to avoid overtrading.
- Institutions often defend VWAP levels, so be aware of their impact.

KEY APPLICATIONS OF VWAP IN INTRADAY TRADING

- **Trend Identification:**
 - When the price is above VWAP, it indicates a bullish trend.
 - When below VWAP, it indicates a bearish trend.
- **Dynamic Support and Resistance:**
 - VWAP can serve as support in uptrends and resistance in downtrends.
- **Optimal Entry/Exit Points:**
 - **Buy:** Enter when the price is below VWAP, or when the price crosses above VWAP with high volume.
 - **Sell/Short:** Enter when the price is above VWAP or breaks below VWAP with high volume.
- **Institutional Order Execution:**
 - VWAP is widely used by institutional traders to minimize market impact.
- **Range Confirmation:**
 - Price hovering near VWAP often signals market consolidation.

BEST PRACTICES

- Combine VWAP with other indicators like MACD, RSI, or volume profiles.
- Avoid trading during the first 15–30 minutes of the session.
- Stick to high-volume, liquid stocks for more reliable results.

ONE-LINE INTRADAY RULE UNDER VWAP

- **Above VWAP → Only Buy**

- **Below VWAP → Only Sell**

INTRADAY TRADING RULES

1. Avoid trading in volatile markets. Intraday trading is most successful when market direction and momentum are predictable.
2. Set profit targets based on a favorable risk-reward ratio (3:1 or 2:1), not 1:1.
3. Intraday trading is about protecting capital—if you protect your capital, profits will follow.
4. Always use stop losses; without them, you risk large, unmanageable losses.
5. Be cautious when trading with margins—keep an eye on potential losses.

RESULTS AND DISCUSSION

RESULTS

The analysis of VWAP reveals that it is an effective intraday trading indicator for determining market sentiment, trend direction, and fair value. The findings from the study are:

1. Prices above VWAP generally indicate bullish sentiment, while prices below VWAP suggest bearish sentiment.
2. VWAP acts as dynamic support and resistance, with prices often reacting near the VWAP line.
3. VWAP-based strategies such as pullback, rejection, and breakout provide clear entry and exit points when combined with volume and price action.
4. Trades that align with VWAP bias (buy above VWAP, sell below VWAP) tend to show better risk-reward outcomes than counter-trend trades.
5. The VWAP indicator is most effective in high-volume, trending market conditions, especially in the early to mid-session of the trading day.

DISCUSSION

VWAP stands out as a more refined indicator than traditional moving averages since it incorporates both price and volume, reflecting where significant market participation has occurred. This explains why institutional traders rely heavily on VWAP for trade execution. VWAP's role as a market reference point—above VWAP indicating buyer dominance and below indicating seller dominance—reinforces its utility.

However, its effectiveness is diminished in sideways or choppy markets where price repeatedly crosses VWAP, causing false signals. Therefore, combining VWAP with volume confirmation, price action, and disciplined trading rules is crucial.

SUGGESTIONS & CONCLUSION

SUGGESTIONS

- Use VWAP in conjunction with volume and price action for better accuracy.
- Avoid trading in the first 5–15 minutes after market open.
- Limit VWAP strategies to liquid stocks and indices.
- Follow strict risk management rules, such as predefined stop losses and favorable risk-reward ratios (2:1 or 3:1).
- Limit the number of VWAP trades per day to prevent overtrading.

CONCLUSION

The study concludes that VWAP is a robust and effective intraday trading indicator. Its ability to incorporate price and volume data makes it a superior tool for identifying market trends and fair value. When used in alignment with market trends and supported by proper risk management, VWAP-based strategies can improve intraday trading outcomes. However, misusing VWAP in sideways markets or failing to use stop losses can lead to inconsistent results. Thus, VWAP is best viewed as a professional-grade intraday benchmark and can be a valuable tool for both retail and institutional traders when applied with discipline and strategy.

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A COMPARATIVE STUDY OF ACCOUNTING PRACTICES AND PROVISIONAL NORMS OF NON-PERFORMING ASSETS (NPAs) IN BANKS AND NBFCs OF ULWE NODE NAVI MUMBAI REGION

¹Karan J. Koli and ²Dr. Nilesh E. Koli

^{1,2}Assistant Professor, Department of Accounting and Finance, Changu Kana Thakur A. C. S. College New Panvel (Autonomous)

¹karankoli1811@gmail.com and ²nilesh5680@gmail.com

ABSTRACT

Non-Performing Assets (NPAs) have emerged as a critical challenge affecting the financial stability and operational efficiency of financial institutions in India. Both banks and Non-Banking Financial Companies (NBFCs) play a significant role in credit delivery; however, differences in their accounting practices and prudential norms for NPAs often lead to variations in asset quality recognition and financial reporting. This study aims to undertake a comparative analysis of the accounting practices and provisioning norms related to NPAs followed by banks and NBFCs, with a specific focus on the Navi Mumbai region.

The research examines regulatory guidelines prescribed by the Reserve Bank of India (RBI) and analyses how these norms are implemented by selected banks and NBFCs operating in the region. Using both primary and secondary data, the study evaluates key parameters such as NPA classification, income recognition, provisioning requirements, and disclosure practices. The findings highlight notable differences in the treatment of NPAs between banks and NBFCs, reflecting variations in regulatory frameworks, risk exposure, and operational models.

The study seeks to provide insights into the effectiveness and consistency of existing NPA norms and their impact on financial transparency and credit risk management. By focusing on a specific geographical region, the research adds practical relevance and offers useful implications for regulators, financial institutions, and researchers interested in strengthening asset quality management and ensuring sustainable growth in the financial sector

Keywords: *Non-Performing Assets, Banks, NBFCs, Asset Quality, Profitability, Credit Risk, India*

1. INTRODUCTION

The Indian financial system is one of the largest and most diversified in the world, with banks and Non-Banking Financial Companies (NBFCs) playing a vital role in mobilizing savings and providing credit. A Non-Performing Asset (NPA) refers to a loan or advance for which the principal or interest remains overdue for a period of more than 90 days, as per RBI guidelines.

The rising level of NPAs poses serious challenges to financial institutions by reducing profitability, weakening capital adequacy, and constraining credit growth. While banks are heavily regulated and form the backbone of the financial system, NBFCs complement banking services by catering to underserved sectors such as MSMEs, retail borrowers, and rural areas. However, differences in operational models, risk exposure, and regulatory frameworks lead to varying NPA behavior between banks and NBFCs.

MEANING OF BANKING

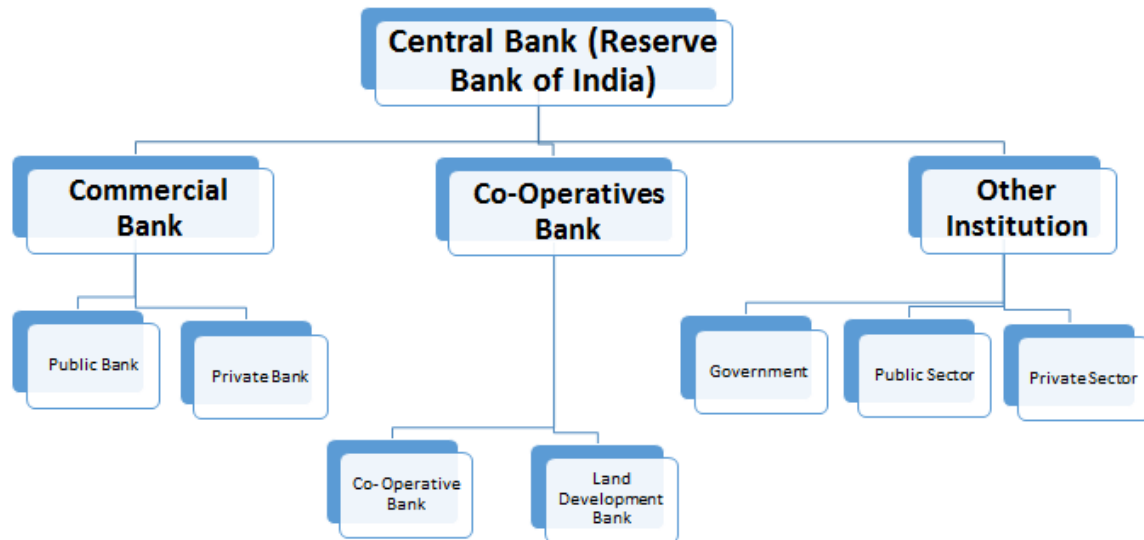
Banking is an industry that handles cash, credit, and other financial transactions. Banks provide a Safe place to Store extra cash and credit. They offer savings accounts, Certificates of Deposit, and checking accounts. Banks use these deposits to make loans. These loans include home mortgages, business loans, and car loans.

A Bank is a financial institution licensed to receive deposits and make loans. Two of the most common types of banks are commercial/retail and investment banks. Depending on type, a bank may also provide various financial services ranging from providing safe deposit boxes and currency exchange to retirement and wealth management.

DEFINITION OF BANKING

According to Sec. 5 (1) (b) of the Banking Regulation Act, 1949, a banking company means the accepting, for the purpose of lending or investment, of deposits of money from the public, repayable on demand or otherwise and withdrawn by Cheque, Draft, Order, or otherwise.

According to Jonson's Dictionary, bank is "a place where money is laid up to called for occasionally" and banker is the "one that traffics in money, one that keeps manages the bank".

TYPES OF BANKS**Structure of banking financial companies of India****Introduction of Non-Banking Financial Companies**

Non-Banking Financial Companies (NBFCs) are financial institutions that offer banking services without meeting the legal definition of a bank. In India, NBFCs play a vital role in bridging the credit gap, particularly in underserved and unbanked areas. Regulated by the Reserve Bank of India (RBI) under the RBI Act, 1934, these institutions are instrumental in promoting financial inclusion by providing a wide range of financial services, including loans, asset financing, investment, and insurance.

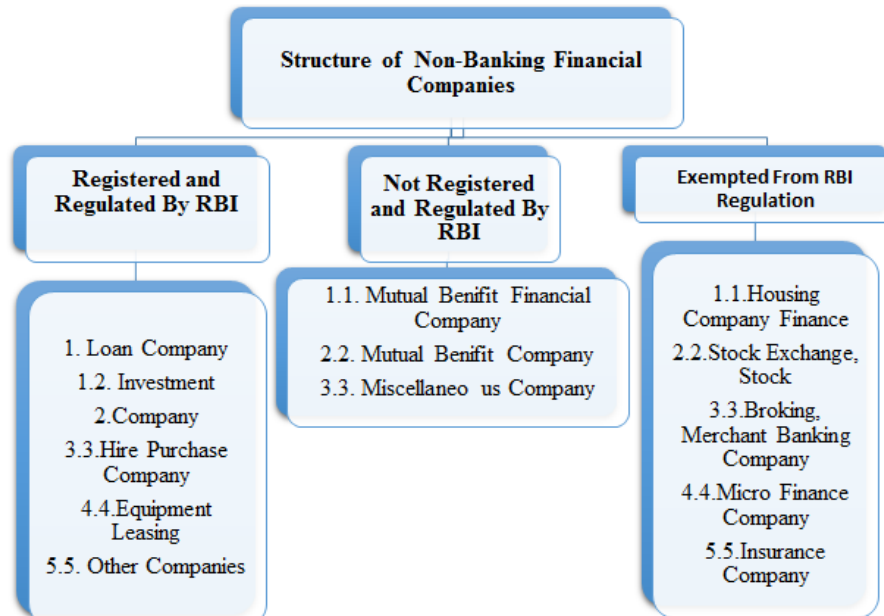
NBFCs differ from traditional banks as they cannot accept demand deposits and do not form part of the payment and settlement system. However, they contribute significantly to the Indian economy by catering to segments such as micro, small, and medium enterprises (MSMEs), infrastructure projects, and retail borrowers. Key types of NBFCs include asset finance companies, loan companies, investment companies, infrastructure finance companies, and microfinance institutions.

Meaning of NBFCs

A Non-Banking Financial Company (NBFC) is a company registered under the Companies Act, 1956. NBFCs, or Non-Banking Financial Companies, are financial institutions that provide various banking-like services, such as giving loans, credit, and investment options, but they are not actual banks. They do not hold a banking license and cannot accept demand deposits (like savings or current account deposits).

Definition of NBFCs

As defined under section 45-I (e) of the RBI Act, a “non-banking institution” means a company, corporation or cooperative society. Further, the Act defines a “company” as a company as defined in section 3 of the Companies Act, 1956 and includes a foreign company within the meaning of section 591 of that Act. It may be noted that the RBI Act has not included the Companies incorporated under the Companies Act, 2013 in the definition. However, as the Companies Act, 2013 has since replaced the Companies Act, 1956, it might be implied that the Companies incorporated under the new Act are also covered in the definition.



Number of NBFCs in India (2013–2025) (Approximate figures based on RBI data and reports)

Year	No of NBFCs	Year	No of NBFCs
2013	12,630	2020	9,533
2014	11,769	2021	9,507
2015	11,225	2022	9,209
2016	11,043	2023	9,100
2017	11,469	2024	8800
2018	10,190	2025	8600

Non-Performing Assets:

Non-performing assets (NPA) refer to the classification of loans and advances in the books of a lender (usually banks) in which there is no payment of interest and principal has been received and is “past due.” In most cases, debt has been classified as NPAs where the loan payments have been outstanding for more than 90 days.

In the liberalized economy, Banking and Financial sector get high priority. The banks in India are facing the problem of Non-Performing Assets (NPAs). The earning capacity and profitability of the banks are highly affected because of the existence of NPAs.

Definition:

“An asset including leased assets becomes non-performing when it ceases to generate income for the bank. The Non-Performing Assets (NPA) was defined as a credit facility in respect of which the interest and / or instalment of principal has remained ‘past due’ for a specific period of time”. **Classification of Loan Assets:**

Non-Performing Assets (NPAs) are loans or advances given by banks that stop generating income because the borrower fails to repay the principal or interest for a certain period-usually 90 days or more. Simply put, when a loan stops earning money for the bank, it is called a non-performing asset.

CLASSIFICATION OF LOAN ASSETS

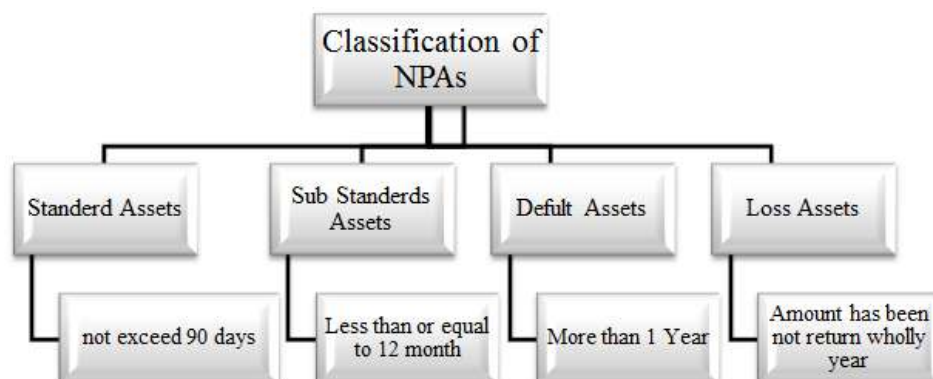


Chart No VI Classification of NPAs

The Reserve Bank of India (RBI) classifies NPAs into three main categories based on how long the loan has been overdue and the chances of recovery:

Substandard Assets: These are loans that have remained non-performing for up to 12 months. They show clear signs of financial weakness, and while there is some risk, there is still a possibility of recovery.

Doubtful Assets: If a loan stays in the substandard category for more than 12 months, it becomes a doubtful asset. The chances of recovering the full amount are very slim, and the risk to the bank is much higher.

Loss Assets: These are loans where the bank or auditors have identified a loss, meaning the amount is unlikely to be recovered. Such assets are considered almost worthless, though there might be some small recovery value.

The RBI guidelines, effective from March 31, 2005, require banks to classify and provision for these NPAs carefully to reflect the true financial health of the institution. This classification helps banks manage risks better and maintain transparency. It also ensures that banks set aside funds (provisions) to cover potential losses from these bad loans, protecting depositors and the banking system.

REVIEW OF LITERATURE

Narsimhan Committee – Reform I (1991) ¹The development of the financial sector has been a major milestone, playing a key role in boosting our country's savings rate, especially among households. The main focus was to review how the financial system is currently structured, including its different parts, and to suggest ways to make it work better. This means improving how efficiently and effectively the system operates, with special attention to how commercial banks and financial institutions manage their operations, stay accountable, and maintain profitability.

Narasimhan Committee – Reform II² (1998): Reform of the Indian banking sector began following the 1991 report of the Committee on Financial System (CFS), led by M. Narasimham. The second phase of reforms focuses on three key, interconnected areas to strengthen the banking system's foundation and bring structural improvements. These include ensuring banks maintain adequate capital (capital adequacy), improving the quality of their assets by reducing bad loans (asset quality), and enforcing prudential norms-rules that promote careful and responsible banking practices. Alongside these, upgrading the systems and methods banks use is essential to make operations more efficient, transparent, and robust. Together, these measures aim to build a stronger, more stable, and competitive banking sector that can better support India's growing economy.

Ankita C. Kanchan S., (2017)³ In their study titled "A Study of Non-Performing Assets of District Central Co-operative Banks in Rajasthan," the authors examined how NPAs are managed and what causes them in these banks. They conducted a survey and found that at the appraisal stage, the main issue was the lack of authority to properly select borrowers. During the sanction and disbursement stage, bank officials faced problems like incomplete or faulty legal documents and political pressure. After disbursement, the key reasons for NPAs included borrowers failing to submit security papers and periodic statements, diversion of funds, and poor monitoring by the banks.

Dr.R.Elangovan, (2012)³ in his study "An analysis of Non-Performing Assets in Urban Co-operative Bank Ltd." In the study "An Analysis of Non-Performing Assets in Urban Co-operative Bank Ltd.," the researchers evaluated the NPA situation of the Urban Co-operative Bank in Villupuram. They found that NPAs arose mainly due to weaknesses in credit appraisal, poor monitoring and follow-ups, delays in payment settlements, and issues with government subsidiaries.

RESEARCH METHODOLOGY

The study will use a descriptive and exploratory research design to thoroughly examine the performance of NPAs in Banking and Non-Banking Financial Companies of ulwe node Navi Mumbai region .This combined approach will help in understanding how large the NPA problem is, what causes it, and its impact, while also assessing the effectiveness of current management strategies. Descriptive research will provide a clear picture of the existing situation, and exploratory research will help uncover new insights and deeper understanding to improve NPA handling

¹ Narsimhan Committee I – Reform I (1991)

² Narsimhan Committee II – Reform I (1991)

³ Dr. R. Elan³govan, (2012)³ in his study "An analysis of Non-Performing Assets in Urban Co-operative Bank Ltd."

OBJECTIVES OF THE STUDY

The main aims of the study are:

- **To compare accounting practices related to NPAs** between banks and NBFCs operating in the ulwe node Navi Mumbai region.
- **To analyze the provisioning norms adopted** by banks and NBFCs with respect to NPAs.
- **To identify key differences** in how NPAs are recognized, classified, and reported.
- **To assess the impact of differences** in accounting practices on financial performance and asset quality reporting.
- **To provide recommendations** for enhancing transparency and consistency in NPA reporting.

SCOPE OF THE STUDY

The present study is geographically limited to financial institutions operating in the ulwe node Navi Mumbai region of Maharashtra, India. It focuses specifically on institutions that have an active presence and regularly report their financial performance within this area.

From an institutional perspective, the study covers Scheduled Commercial Banks having branches in Navi Mumbai as well as Non-Banking Financial Companies (NBFCs) that are registered with the Reserve Bank of India (RBI) and are actively functioning in the region.

The study considers a time period of five financial years, from 2019–20 to 2023–24, in order to observe recent trends and changes in accounting practices and provisioning norms related to Non-Performing Assets.

Thematically, the research examines NPA classification standards, provisioning norms and methods, and the accounting standards followed by banks and NBFCs, such as Indian GAAP and Ind AS. In addition, the study undertakes a comparative analysis of disclosure practices and transparency adopted by banks and NBFCs in reporting NPAs.

HYPOTHESIS

Hypothesis 01	Ho There is <i>no significant difference</i> in NPA accounting practices between banks and NBFCs in ulwe node Navi Mumbai.
	H1 - There <i>is</i> a significant difference between banks and NBFCs regarding accounting practices for NPAs.

LIMITATIONS

The study may be limited by the availability and reliability of data, regional variations in Banking and Non-Banking Financial Companies banking practices, and the dynamic nature of economic conditions affecting NPAs.

This methodology and objective framework will provide a comprehensive understanding of NPAs in rural Banking and Non-Banking Financial Companies, enabling targeted strategies to improve their financial health and contribution to rural development.

DATA COLLECTION

Primary Data: primary data has been collected by structured interview of Banking and Non-banking finance company of ulwe node.

Secondary Data: Secondary data has been collected for Banking and non-banking financial companies' official website and annual reports and newspaper.

SOURCES OF DATA

The study is entirely based on the secondary data available from the reports, articles, journals, documents, printed literatures, (Banking and Non-Banking Financial Companies) and other online data bases etc.

Period of the study: Financial Year 2019 to 2020 and 2024-2025.

Sr. No.	Banking Companies/ NBFC	Types of Banks	Total Number of Banks	Percentage of Selection	No. of Banks Selected
1	Banking	Public Bank	04	10%	01
2	Banking	Private Bank	08	10%	01
3	Co-operative Bank	Co-operative Bank	04	10%	01
4	NBFC	NBFC	12	10%	01

SAMPLE FRAMEWORK

Interpretation: The table shows the sampling method used to select banks and NBFCs in Navi Mumbai. The total population includes public banks, private banks, co-operative banks, and NBFCs. From each category, 10% of institutions were selected, which resulted in the selection of one bank or NBFC from each group. This sampling method ensures that all major types of financial institutions are represented in the study. By selecting different categories of banks and NBFCs, the study provides a fair and balanced view of the banking and NBFC sector in Navi Mumbai.

Public Bank	Private Bank	Co-operative Bank	NBFC
State Bank of India	Axis Bank	Abhyudaya Co-Operative Bank Ltd	Muthoot Finance
Bank of India (BOI)	HDFC Bank	Saraswat Co-operative Bank Limited	Mahindra Finance
Bank of Maharashtra	ICICI Bank:	Gopinath Patil Parsik Janata Sahakari Bank Ltd	HDB Financial Services
Indian Bank	Kotak Mahindra Bank	Gopinath Patil Parsik Janata Sahakari Bank Ltd	IIFL Finance
	IDFC First Bank		Bajaj Finance/Housing
	Bandhan Bank		Manappuram Finance
	RBL Bank		L&T Finance
	Yes Bank		Asset House Finance
			Dream Finance
			Red Mammoth Ventures LLP
			Rapid Loan Finance
			Mangal Credit And Fincorp Ltd

DATA INTERPRETATION AND ANALYSIS

Interpretation

- The graph indicates that **SBI, G.P. Parsik Bank, and IIFL** strongly feel that provisioning significantly reduces profitability, while **HDFC Bank reports a relatively lower impact**. This suggests that institutions with higher NPA exposure face greater pressure on earnings due to provisioning requirements.
- The findings show that **NPA recovery is a major challenge for all institutions**, with stronger concern expressed by **SBI, the co-operative bank, and the NBFC**. Procedural delays and extended recovery processes contribute to this difficulty.
- The graph reveals that **banks follow more uniform and standardized NPA accounting practices** compared to NBFCs. This can be attributed to stricter regulation and the use of centralized banking systems.
- Results indicate that **NBFCs are perceived to have higher NPA risk**, especially by **HDFC Bank and IIFL**. This reflects the greater credit risk associated with unsecured and retail-focused lending.
- All institutions acknowledge the **importance of accounting software in managing NPAs**. However, banks using **CBS platforms report better efficiency** in real-time monitoring and reporting than co-operative banks and NBFCs.

FINDINGS OF THE STUDY

- All selected banks and NBFCs strictly follow **RBI norms for NPA identification and provisioning**.
- 90-day norm** for NPA classification is uniformly applied across banks and NBFCs.

- Interest on NPAs is recognized strictly on a **cash basis** in all institutions.
- **Provisioning norms significantly affect profitability**, especially in public sector banks, co-operative banks, and NBFCs.
- **Recovery of NPAs is a major operational challenge** across all institutions despite legal mechanisms.
- Banks exhibit **higher standardization and automation** in NPA accounting compared to NBFCs.
- NBFCs face **higher NPA risk** due to unsecured lending and higher exposure to retail borrowers.
- Use of **Core Banking Solutions (CBS)** in banks ensures better real-time monitoring and compliance.
- Co-operative banks face **technology and resource constraints**, impacting NPA recovery efficiency.
- RBI regulations are considered **effective**, but implementation challenges persist at operational levels.

SUGGESTIONS

1. Banks and NBFCs should strengthen early warning systems to detect stress before accounts turn NPAs.
2. NBFCs should adopt more standardized accounting and provisioning frameworks aligned closely with banks.
3. Co-operative banks must invest in advanced CBS and recovery automation tools.
4. Faster legal resolution mechanisms should be implemented to reduce delays under SARFAESI.
5. Institutions should enhance credit appraisal and post-sanction monitoring, especially for MSME and retail loans.
6. RBI may consider sector-specific flexibility for NBFCs without compromising asset quality.
7. Regular training programs should be conducted for staff on NPA management and recovery laws.
8. Greater use of data analytics and AI-based credit scoring can help reduce future NPAs.

CONCLUSION

This study analyzed the accounting practices and provisioning norms related to Non-Performing Assets (NPAs) of State Bank of India, HDFC Bank, G.P. Parsik Co-operative Bank, and IIFL (NBFC) in the Ulwe Node region. The findings confirm that all institutions follow RBI guidelines, including the 90-day NPA classification norm and cash-basis interest recognition, ensuring consistency and transparency in NPA reporting.

The study highlights that public sector and co-operative banks face challenges due to legacy NPAs and recovery delays, while private sector banks maintain better asset quality through stronger credit systems and technology. NBFCs carry relatively higher risk because of unsecured lending. Although regulations are uniform, differences in technology adoption, risk exposure, and operational efficiency affect NPA management, emphasizing the need for improved recovery mechanisms and digital systems.

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A STUDY OF FINANCIAL LITERACY LEVELS AMONG COLLEGE UNDERGRADUATE STUDENTS

¹Komal A. Mansukhani and ²Khushi A. Labana

¹Research Scholar, ^{1,2}Assistant Professor and R. K. Talreja College of Arts, Science & Commerce (CMC - Unaided), Ulhasnagar

ABSTRACT

Financial literacy plays a vital role in enabling individuals to make informed and effective financial decisions, particularly among college undergraduate students who are beginning to manage their personal finances independently. The present study aims to assess the financial literacy levels of college undergraduate students and to examine their awareness of basic financial concepts such as budgeting, saving, investment, credit usage, and risk management. The study is based on primary data collected through a structured questionnaire administered to undergraduate students from different academic streams. Descriptive and analytical tools are used to evaluate students' financial knowledge, attitudes, and financial behavior. The findings indicate that although students possess a basic understanding of day-to-day financial practices, there is limited awareness regarding investment avenues, insurance, and long-term financial planning. The study highlights the influence of factors such as academic background and exposure to financial education on literacy levels. The results emphasize the need for incorporating financial literacy programs within the undergraduate curriculum to enhance students' financial competence and long-term financial well-being.

Keywords: Financial Literacy, Undergraduate Students, Financial Knowledge, Financial Attitude, Financial Behavior, Personal Financial Planning

1) INTRODUCTION

Financial literacy refers to the ability to understand and effectively use various financial skills, including budgeting, saving, investing, credit management, and financial planning. In today's rapidly changing economic environment, financial literacy has become an essential life skill for individuals to make informed and responsible financial decisions. Adequate financial knowledge enables individuals to manage their income efficiently, avoid excessive debt, and plan for long-term financial security.

College undergraduate students represent a crucial segment of the population as they are at a transitional stage between academic life and financial independence. During this phase, students begin to manage personal expenses, savings, educational loans, and early investment decisions. However, many undergraduate students lack sufficient financial knowledge and practical exposure, which may lead to poor financial choices and long-term economic difficulties.

The increasing availability of financial products, digital payment systems, and credit facilities has further intensified the need for financial literacy among students. Without adequate awareness and understanding, students may be vulnerable to financial mismanagement and debt-related problems. Hence, assessing the financial literacy levels of college undergraduate students is essential to identify existing knowledge gaps and to develop effective financial education strategies.

This study aims to examine the financial literacy levels among college undergraduate students by analyzing their knowledge, attitudes, and financial behavior. The findings of the study are expected to provide valuable insights for educational institutions, policymakers, and curriculum developers in designing programs that promote financial awareness and responsible financial decision-making among undergraduate students.

2) OBJECTIVES OF THE STUDY

- i. To assess the level of financial literacy among college undergraduate students.
- ii. To examine students' awareness and understanding of basic financial concepts such as budgeting, saving, investment, credit management, and insurance.
- iii. To analyze the financial attitudes and financial behavior of undergraduate students.
- iv. To identify the factors influencing financial literacy levels among college undergraduate students.
- v. To suggest measures for improving financial literacy among undergraduate students.

3) SIGNIFICANCE OF THE STUDY

Financial literacy is essential for effective personal financial management and long-term economic well-being. College undergraduate students are at a critical stage of life where they begin to make independent financial

decisions. This study is significant as it highlights the existing level of financial awareness among undergraduate students and identifies gaps in their financial knowledge.

The findings of the study can assist educational institutions, policymakers, and curriculum developers in designing appropriate financial education programs. Moreover, the study contributes to academic literature by providing insights into students' financial behavior and attitudes, thereby promoting responsible financial decision-making and enhancing financial inclusion.

4) SCOPE OF THE STUDY

The scope of the study is limited to college undergraduate students. It focuses on assessing their financial literacy levels with respect to basic financial concepts such as savings, budgeting, investment options, credit usage, insurance, and financial planning.

The study considers selected demographic variables such as age, gender, academic stream, and year of study. The analysis is based on primary data collected through a structured questionnaire. The findings are relevant within the geographical area and time period in which the study is conducted.

5) LIMITATIONS OF THE STUDY

- i. The study is confined to college undergraduate students and therefore the findings cannot be generalized to postgraduate students or other population groups.
- ii. The data are collected through self-reported questionnaires, which may be subject to respondent bias.
- iii. The study covers a limited geographical area and sample size, which may restrict the generalizability of the results.
- iv. Time constraints may limit the depth of analysis and inclusion of additional variables.
- v. The study focuses on basic financial literacy concepts and does not cover advanced financial instruments in detail.

6) RESEARCH METHODOLOGY

The present study adopts a **descriptive research design** to assess the financial literacy levels of college undergraduate students. Both **primary and secondary data** are used for the study.

Sources of Data

- **Primary Data:** Collected through a structured questionnaire administered to college undergraduate students.
- **Secondary Data:** Collected from books, research journals, published articles, reports, and online resources related to financial literacy.

Sample Design

- **Population:** College undergraduate students
- **Sample Size:** A total of 140 undergraduate students were selected for the study.
- **Sampling Technique:** Convenience sampling
- **Sampling Unit:** Individual undergraduate students

Area of the Study

The study was conducted in selected colleges located in Ambernath, Ulhasnagar, and Kalyan.

Period of the Study

The study was conducted during December 2025 to February 2026.

Tools for Data Collection

A structured questionnaire consisting of multiple-choice and Likert-scale questions was used to collect data.

Tools for Data Analysis

- Percentage analysis
- Tables and charts
- Simple statistical tools

REVIEW OF LITERATURE

Financial literacy has gained significant importance in recent years due to its impact on individuals' ability to make informed and responsible financial decisions. It plays a crucial role in promoting effective money management, savings behavior, and long-term financial security, particularly among young adults.

Chen and Volpe (1998) conducted one of the earliest studies examining financial literacy among college students. Their findings revealed that students generally possess limited knowledge of investment and insurance-related concepts. The study highlighted that factors such as academic discipline, gender, and prior financial education influence financial knowledge levels.

Lusardi and Mitchell (2014) emphasized that financial literacy is essential for sound financial planning, including savings, retirement preparation, and investment decisions. Their research demonstrated that many young adults lack understanding of key financial concepts such as interest compounding, inflation, and risk diversification, which can negatively affect long-term financial stability.

Lusardi, Mitchell, and Curto (2009) further found that financial literacy among youth is consistently low across different countries. The study stressed the importance of introducing financial education programs at the school and college levels to improve financial capability and economic well-being.

Agarwal et al. (2015) observed that financial literacy is influenced by demographic and socio-economic factors such as education level, parental background, and exposure to financial information. The study concluded that structured financial education programs significantly enhance students' financial knowledge and improve their financial decision-making skills.

In the Indian context, studies indicate that undergraduate students generally demonstrate moderate awareness of budgeting and savings but limited understanding of investment avenues, insurance, and risk management. Research suggests that while theoretical awareness may exist, practical financial behavior such as regular saving, budgeting, and investment planning remains inadequate among students.

Recent studies also highlight a gap between financial knowledge and financial behavior. Even when students are aware of financial concepts, they may not apply them effectively in real-life situations. This gap underscores the need for integrating financial literacy programs into undergraduate curricula and promoting experiential learning through workshops and financial simulations.

Overall, existing literature indicates that financial literacy among undergraduate students is moderate but insufficient for independent financial decision-making. The studies collectively emphasize the importance of early financial education to enhance financial competence and long-term economic well-being.

7) FINDINGS AND INTERPRETATION

A) Respondent Profile (n = 140)

Table 1: Demographic Details

Variable	Category	No. of Students	Percentage
Gender	Male	72	51.4%
	Female	68	48.6%
Year of Study	I Year	38	27.1%
	II Year	46	32.9%
	III Year	56	40.0%
Stream	Arts	44	31.4%
	Science	48	34.3%
	Commerce/Management	48	34.3%

Interpretation of Demographic Details (n = 140)

The sample consists of 140 students with a nearly equal gender distribution—72 males (51.4%) and 68 females (48.6%), ensuring balanced representation.

In terms of year of study, III Year students form the largest group (40.0%), followed by II Year (32.9%) and I Year (27.1%), indicating higher participation from senior students.

Regarding stream, Science and Commerce/Management students each account for 34.3%, while Arts students make up 31.4%. The distribution across streams is fairly even, providing diverse academic representation in the study.

B) Financial Literacy Assessment Results

A structured questionnaire with **25 questions** covering:

- Budgeting & Saving
- Banking & Interest Rates
- Credit & Debt
- Investment Basics

Each correct answer = 1 mark

Maximum score = 25

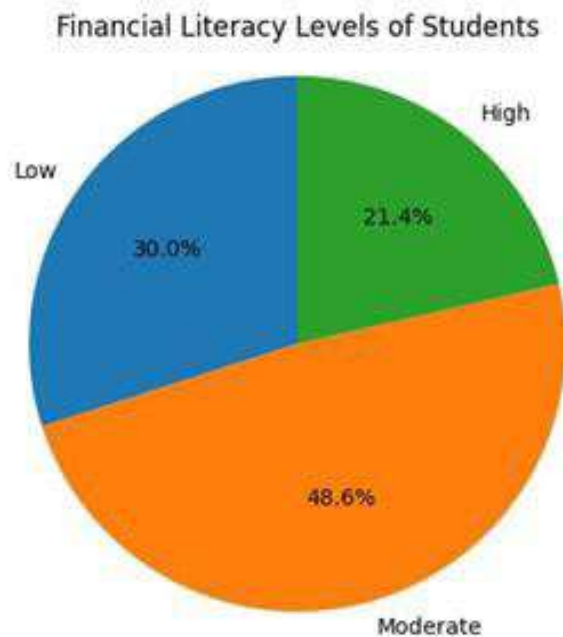


Table 2: Financial Literacy Levels

	Score Range	Students	Percentage
Low	0 – 10	42	30.0%
Moderate	11 – 18	68	48.6%
High	19 – 25	30	21.4%
Total		140	100%

Interpretation of Results

- Nearly **half of the students (48.6%)** fall under the *moderate* financial literacy category, indicating basic awareness but limited practical understanding.
- **30% of students** show *low financial literacy*, revealing insufficient knowledge of fundamental financial concepts.
- Only **21.4%** demonstrate *high financial literacy*, suggesting that advanced financial knowledge is limited among undergraduates.

This indicates that while students possess some theoretical understanding, **practical financial competence remains weak.**

C) Area-wise Financial Knowledge

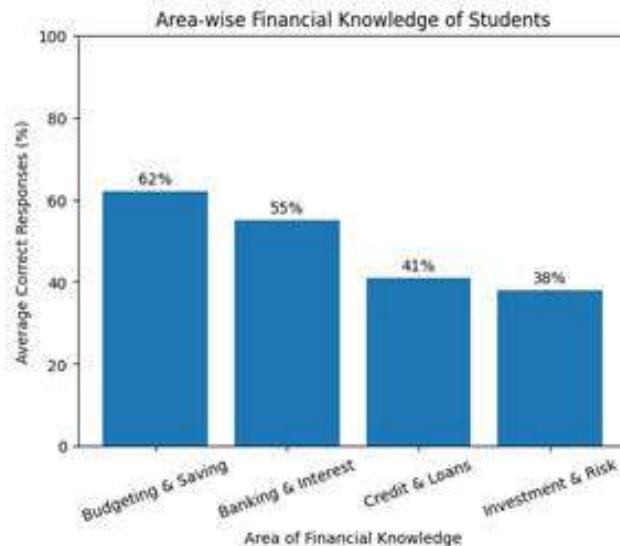


Table 3: Correct Responses by Topic

Area	Average Correct Responses
Budgeting & saving	62%
Banking & Interest	55%
Credit & Loans	41%
Investment & Risk	38%

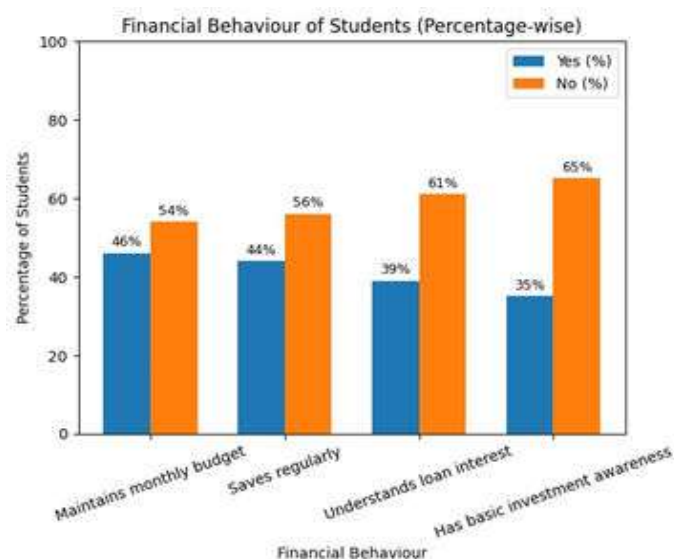
Interpretation

- Students are relatively better at **budgeting and saving**.
- Knowledge related to **credit management and investments** is low, which may expose students to debt mismanagement and poor financial decisions.

D) Financial Behaviour of Students

Table 4: Financial Practices

Behaviour	Yes (%)	No (%)
Maintains a monthly budget	46%	54%
Saves regularly	44%	56%
Understands loan interest clearly	39%	61%
Has basic investment awareness	35%	65%

**Interpretation**

Despite moderate awareness, **actual financial practices are weak**, showing a clear gap between knowledge and application.

Major Findings of the Study

- i. Financial literacy among undergraduate students is **mostly moderate**, but not sufficient for independent financial decision-making.
- ii. A significant proportion of students lack understanding of **loans, interest rates, and investment options**.
- iii. Students from commerce and management streams scored higher than arts and science students.
- iv. Financial behaviour such as budgeting and saving is **inconsistent**, even among students with reasonable knowledge.
- v. Lack of formal financial education is a major reason for low literacy levels.

9. SUGGESTIONS

- i. **Introduce compulsory financial literacy courses** for all undergraduate programs.
- ii. Conduct **workshops on budgeting, credit management, and investments** using real-life examples.
- iii. Encourage **practical learning tools** such as financial planning exercises and simulations.
- iv. Colleges should organize **guest lectures by financial professionals** to improve real-world understanding.
- v. Early financial education can help students develop **healthy money habits** before entering the workforce.

10. CONCLUSION

The study of 140 undergraduate students reveals that financial literacy levels are **moderate but uneven**, with noticeable gaps in practical financial knowledge. Strengthening financial education at the college level can significantly improve students' financial decision-making ability and long-term economic well-being.

The findings indicate that academic background and exposure to financial education play an important role in shaping students' financial knowledge and behavior. The study concludes that enhancing financial literacy at the undergraduate level is essential for developing financially responsible individuals and ensuring long-term economic well-being.

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IMPACT OF DIGITAL PAYMENT SYSTEMS ON FINANCIAL INCLUSION AMONG COLLEGE STUDENTS

¹Dr. Hanumanth Shriram Patil and ²Komal A. Mansukhani

¹Associate Professor, School of Management Sciences, Swami Ramanand Teerth Marathwada University Sub-campus, Latur (M.S)

²Research Scholar, Swami Ramanand Teerth Marathwada University Sub-campus, Latur (M.S), Assistant Professor, R. K. Talreja College of Arts, Science & Commerce (CMC - Unaided), Ulhasnagar

ABSTRACT

Digital payment systems have become an integral part of the modern financial ecosystem, significantly transforming the way financial transactions are carried out. These systems play a crucial role in promoting financial inclusion by providing easy, fast, and secure access to formal financial services. College students, being active users of digital technology, represent an important group for understanding the impact of digital payments on financial inclusion. This study examines the influence of digital payment systems on the level of financial inclusion among college students.

The research is based on primary data collected through a structured questionnaire administered to college students. The study analyzes students' awareness, accessibility, and usage patterns of digital payment systems such as UPI, debit cards, mobile wallets, and internet banking. It also evaluates how the adoption of these digital tools contributes to improved access to banking services, reduced dependence on cash, and greater participation in the formal financial system.

The findings indicate that digital payment systems have positively influenced financial inclusion among college students by enhancing convenience, increasing transaction frequency, and encouraging the use of basic financial services. However, issues such as security concerns, limited digital literacy, and technical difficulties continue to restrict the effective use of digital payments for some students. The study highlights the need for targeted awareness programs, digital literacy initiatives, and improved infrastructure to strengthen the role of digital payment systems in achieving comprehensive financial inclusion among the student population.

The results of this study can assist policymakers, educational institutions, and financial service providers in designing strategies to promote responsible and inclusive use of digital payment systems among college students.

Keywords: Digital Payment Systems, Financial Inclusion, College Students, Digital Banking, Financial Access

1. INTRODUCTION

The rapid advancement of digital technology has significantly changed the way financial transactions are carried out across the world. In recent years, digital payment systems such as Unified Payments Interface (UPI), mobile wallets, debit cards, and internet banking have gained widespread acceptance due to their convenience, speed, and accessibility. These systems have become an important instrument in promoting financial inclusion by enabling individuals to access formal financial services without relying heavily on cash-based transactions.

Financial inclusion refers to the availability and usage of affordable financial services by all sections of society. For college students, digital payment systems serve as an entry point into the formal financial system, helping them manage expenses, make payments, and transfer money efficiently. As students increasingly adopt digital modes of payment for everyday transactions such as fee payments, shopping, and bill payments, their interaction with banking and financial services has increased.

Despite the growing adoption of digital payments among college students, differences exist in terms of awareness, frequency of use, and access to various financial services. Factors such as digital literacy, security concerns, and availability of technological infrastructure influence the extent to which digital payment systems contribute to financial inclusion. In this context, the present study seeks to examine the impact of digital payment systems on financial inclusion among college students.

2. OBJECTIVES OF THE STUDY

The specific objectives of the study are:

- a) To examine the level of awareness of digital payment systems among college students.
- b) To analyze the usage patterns of various digital payment methods used by college students.
- c) To assess the role of digital payment systems in enhancing financial inclusion among college students.

- d) To identify the challenges faced by college students in using digital payment systems.
- e) To suggest measures for improving digital payment adoption and financial inclusion among students.

3. NEED OF THE STUDY

- a) The increasing dependence on digital payment systems has made it essential to understand their role in promoting financial inclusion, especially among young individuals.
- b) College students represent future earners and decision-makers, and their early exposure to digital financial services can shape long-term financial behaviour.
- c) However, mere access to digital payment platforms does not guarantee effective financial inclusion unless students are aware of and actively use these services.
- d) This study is needed to assess whether digital payment systems have truly enhanced financial inclusion among college students or are limited to basic transactional usage.
- e) The findings of the study can help educational institutions, policymakers, and financial service providers design targeted programs to improve digital financial awareness, address usage barriers, and promote inclusive financial practices among students.

4. LIMITATIONS OF THE STUDY

The study has certain limitations that should be considered while interpreting the results:

- a) The study is limited to a selected group of college students and may not represent all student populations.
- b) The data is based on self-reported responses, which may be subject to personal bias.
- c) The study focuses mainly on digital payment systems and does not cover all aspects of financial inclusion in detail.
- d) Time and resource constraints may limit the depth of analysis.
- e) The findings of the study are specific to the geographical area covered, namely Ambernath, Ulhasnagar, and Kalyan, and therefore may not be generalized to other regions.

5. RESEARCH METHODOLOGY

a) Research Design

The study adopts a **descriptive and analytical research design** to examine the impact of digital payment systems on financial inclusion among college students.

b) Area of the Study

The study is conducted in the **Ambarnath, Ulhasnagar, and Kalyan** regions.

c) Population of the Study

The population of the study comprises **college students** pursuing undergraduate programs in the selected area.

d) Sample Size

The total population of undergraduate students in the selected college is approximately 200+. Out of this, a sample of 120 students was selected for the study, representing more than 50% of the total population. Such a proportion is considered adequate for descriptive research, as it ensures better representation and reliability of results. The sample size was also determined considering time constraints and accessibility of respondents. Therefore, 120 respondents were considered sufficient to draw meaningful conclusions regarding digital payment awareness and financial inclusion among students.

e) Sampling Technique

The study adopts convenience sampling, where respondents were selected based on their availability and willingness to participate. This method was suitable due to practical limitations and ease of data collection within the college.

f) Sources of Data

Primary Data:

Collected through a structured questionnaire administered to college students.

Secondary Data:

Collected from books, research journals, published reports, and reliable online sources related to digital payments and financial inclusion.

g) Tool for Data Collection

A **structured questionnaire** was used as the primary data collection tool, consisting of close-ended and Likert-scale questions.

h) Period of the Study

The period of the study was **from December 2025 to January 2026**.

i) Statistical Tools Used

i. Percentage analysis

ii. Tables

j) Scope of the Study

The present study focuses on examining the awareness, usage patterns, and impact of digital payment systems among undergraduate college students. It specifically analyzes how digital payment methods contribute to financial inclusion within the student community.

The study is confined to students of a selected college with a total population of approximately 200+, out of which 120 respondents were surveyed. It covers aspects such as types of digital payment methods used, frequency of usage, benefits experienced, and challenges faced while using digital payment platforms.

The research is limited to the academic period of the study and is based on primary data collected through a structured questionnaire. The findings and suggestions are applicable mainly to college students in similar educational settings and may not represent other population groups.

6. REVIEW OF LITERATURE

Several researchers have examined the role of digital payment systems in promoting financial inclusion and have highlighted their positive impact on access to formal financial services.

Demirgüç-Kunt et al. (2018) emphasized that digital payment platforms significantly reduce barriers to financial access by enabling individuals to perform transactions without physical bank visits. Their study found that digital payments encourage account ownership and regular usage, especially among young and technologically aware users. The research concluded that digital transactions serve as a gateway to broader financial inclusion.

Suri and Jack (2016), in their study on digital financial services, observed that mobile-based payment systems enhance financial participation by offering convenient and low-cost transaction options. Their findings revealed that digital payments not only improve transaction efficiency but also promote savings behavior and financial security among users. The study highlighted the importance of digital infrastructure and user trust in achieving inclusive financial outcomes.

In the Indian context, **Ghosh and Vinod (2017)** analyzed the expansion of digital payment systems following policy initiatives and technological advancements. The study reported that digital payment adoption has improved access to banking services, particularly among students and young adults. However, it also identified challenges such as limited financial literacy and security concerns, which restrict the effective use of digital payment systems.

Recent studies in the Indian context have highlighted the rapid expansion of digital payment systems, particularly after the introduction of the Unified Payments Interface (UPI). According to the Reserve Bank of India (**RBI, 2022**), digital payment transactions have increased significantly due to improved infrastructure, smartphone penetration, and government initiatives promoting a less-cash economy. The report emphasizes that digital payment systems have played a key role in enhancing access to formal financial services among young users.

Kumar and Agarwal (2021) examined the adoption of UPI among youth in India and found that ease of use, convenience, and peer influence are major factors driving digital payment adoption among students. However, the study also pointed out that concerns regarding cybersecurity and data privacy affect long-term trust in digital platforms.

Sharma and Kukreja (2020) analyzed the impact of digital financial services on financial inclusion in urban India. Their findings suggest that digital payment platforms increase banking participation and encourage

regular financial transactions among students and young adults. The study further noted that digital literacy and awareness programs significantly improve the effective usage of digital financial tools.

NPCI (National Payments Corporation of India) reports indicate that UPI has emerged as the most preferred digital payment method among youth due to its simplicity and interoperability across banks. This growth reflects the increasing integration of young individuals into the formal financial system through digital channels.

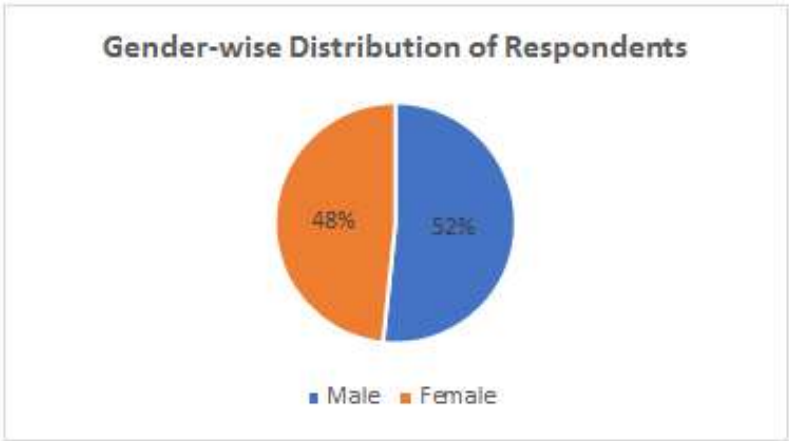
Research focused on students reveals that while awareness of digital payment systems is relatively high, the usage of advanced financial services such as credit facilities and insurance remains limited. Some studies emphasize that digital literacy and trust in digital platforms play a crucial role in determining the adoption of digital payment systems. Security concerns, lack of technical knowledge, and connectivity issues have been identified as major barriers to effective usage.

Overall, Indian literature supports the view that digital payment systems contribute positively to financial inclusion, particularly among technologically active groups such as college students, while also emphasizing the importance of awareness, security, and infrastructure development.

7. DATA ANALYSIS & INTERPRETATION

Table 1: Gender-wise Distribution of Respondents

Gender	Number of Respondents	Percentage (%)
Male	62	51.67
Female	58	48.33
Total	120	100



Interpretation: The table indicates that 51.67% of the respondents are male and 48.33% are female. The distribution reflects a balanced representation of gender, ensuring diverse perspectives on digital payment usage among college students.

Table 2: Awareness of Digital Payment Systems

Awareness Level	Respondents	Percentage (%)
Aware	110	91.67
Not Aware	10	8.33
Total	120	100

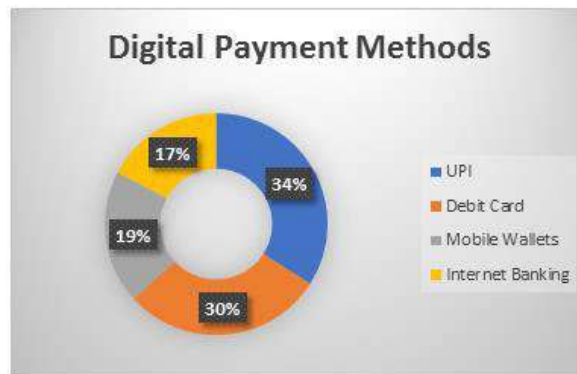


Interpretation: The table shows that a large majority (91.67%) of students are aware of digital payment systems, indicating widespread exposure and familiarity with digital financial tools among college students.

Table 3: Digital Payment Methods Used by Respondents

Digital Payment Method	Respondents	Percentage (%)
UPI	102	85.00
Debit Card	88	73.33
Mobile Wallets	58	48.33
Internet Banking	52	43.33

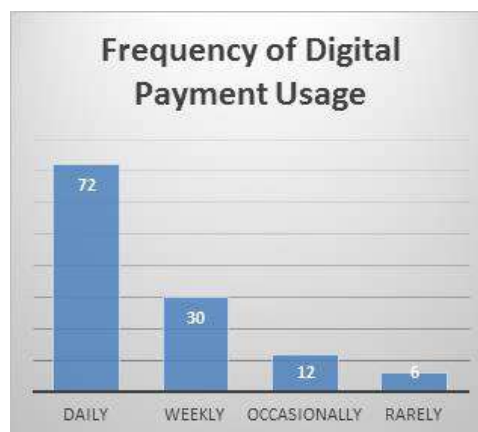
(Multiple responses allowed)



Interpretation: UPI is the most frequently used digital payment method among students, followed by debit cards. This highlights the preference for quick and mobile-friendly payment systems over traditional banking channels.

Table 4: Frequency of Digital Payment Usage

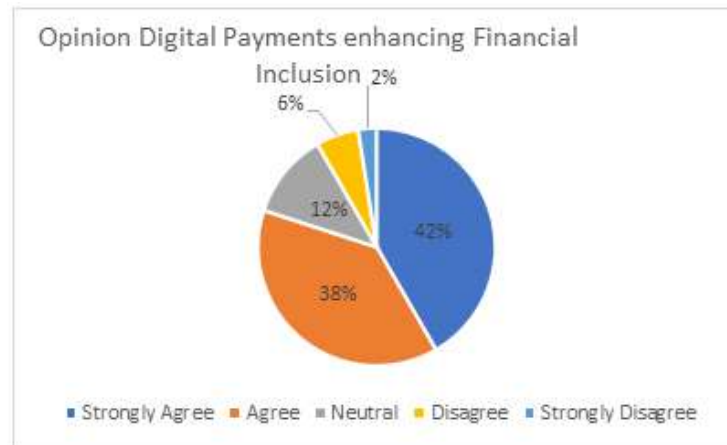
Frequency	Respondents	Percentage (%)
Daily	72	60.00
Weekly	30	25.00
Occasionally	12	10.00
Rarely	6	5.00
Total	120	100



Interpretation: The data reveals that 60% of respondents use digital payment systems on a daily basis. This indicates a high level of dependency on digital payments for routine financial transactions.

Table 5: Opinion on Digital Payments Enhancing Financial Inclusion

Opinion	Respondents	Percentage (%)
Strongly Agree	50	41.67
Agree	46	38.33
Neutral	14	11.67
Disagree	7	5.83
Strongly Disagree	3	2.50
Total	120	100

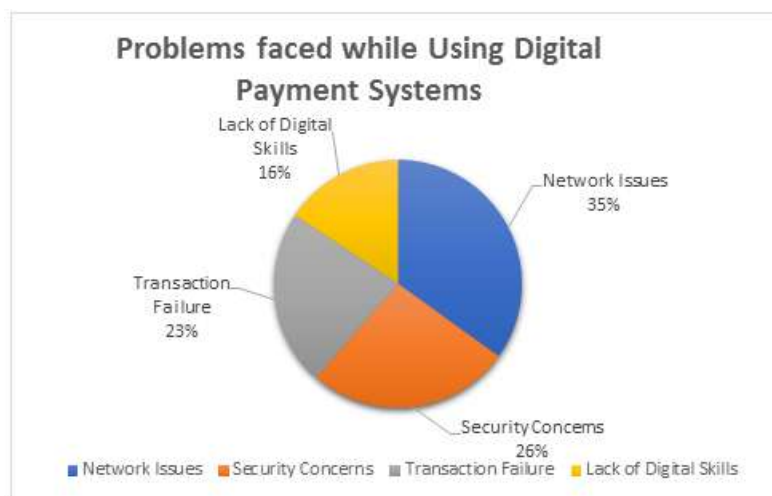


Interpretation: A combined 80% of respondents either agree or strongly agree that digital payment systems have enhanced their access to financial services, demonstrating the positive role of digital payments in promoting financial inclusion.

Table 6: Problems Faced While Using Digital Payment Systems

Problems	Respondents	Percentage (%)
Network Issues	58	48.33
Security Concerns	44	36.67
Transaction Failure	38	31.67
Lack of Digital Skills	26	21.67

(Multiple responses allowed)



Interpretation: Network connectivity issues and security concerns are the major challenges faced by college students while using digital payment systems. These issues may affect user confidence and limit effective financial inclusion.

Overall Interpretation

- The analysis shows a high level of awareness and adoption of digital payment systems among college students.
- Digital payments have significantly reduced reliance on cash and improved access to formal financial services.
- However, technical and security-related challenges remain key barriers that need to be addressed to strengthen financial inclusion.

8. CONCLUSION & SUGGESTIONS

Conclusion

The study clearly shows that digital payment systems have become an important medium for increasing financial inclusion among college students. Most students actively use digital payment methods for their daily

transactions, which has made financial activities more convenient and accessible. The shift towards digital payments has reduced the use of cash and increased students' engagement with formal financial services.

The findings also indicate that digital payments help students develop regular banking habits and improve their participation in the financial system. However, the study identifies certain challenges such as connectivity issues, concerns related to online security, and limited technical understanding among some users. These factors restrict the full utilization of digital payment systems. Despite these limitations, the overall impact of digital payments on financial inclusion among college students is positive.

Suggestions

Based on the outcomes of the study, the following suggestions are proposed:

- i. Colleges should introduce financial awareness and digital payment training programs for students.
- ii. Financial institutions should design easy-to-use and secure digital payment platforms suitable for young users.
- iii. Continuous efforts should be made to improve digital literacy among students to ensure safe usage of digital payment systems.
- iv. Strengthening internet connectivity and technical infrastructure can help reduce transaction-related problems.
- v. Awareness regarding cyber safety and fraud prevention should be increased to build confidence in digital payments.

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RISK MANAGEMENT STRATEGIES AND FINANCIAL PERFORMANCE OF FINANCIAL INSTITUTIONS: AN EMPIRICAL ANALYSIS

¹Mr. Laxman Arjun Patil and ²Dr. Amardeep Bajpai¹Ph. D. Research scholar and ²Assistant Professor School of commerce & management studies, Sandip University, Nashik, Maharashtra 422 213**ABSTRACT**

Effective risk management is essential to the stability of financial institutions that are known to operate in volatile and a highly regulated environment. This empirical research aims to explore the impact of effective financial risk management strategies, which include credit risk management, market risk management, liquidity risk management, and operational risk management, on the financial performance of financial institutions. Through multiple regression analysis on the panel data from selected financial institutions, the impact of the risk management strategies will be empirically evaluated against selected financial performance indicators: return on assets (ROA) and return on equity (ROE). The findings of this research revealed that effective risk management strategies play an important and critical role in enhancing the financial performance of financial institutions, with credit and liquidity risk management standing out as the most important factor in determining financial performance.

Keywords: Risk Management Strategies, Financial Performance, Credit Risk, Liquidity Risk, Financial Institutions, Empirical Study

INTRODUCTION

Financial intermediaries function in an environment with uncertainty, volatility, complex regulation, and technological dynamism. Risk taking is an integral part of financial intermediation activities, but excessive risk can challenge the financial intermediary's stability as well as systemic resilience throughout the market. The financial crisis expanded the need to examine the results of weak risk management systems, with many researchers seeking academic investigation through empirical testing on its effectiveness.

Although several studies have been conducted on the conceptual understanding of the financial institutions' risk management strategies' impact on financial performance, there is still a need to establish empirical research on the impact of various financial institutions' risk management strategies on financial performance. In this respect, the present research explores the financial institutions' risk management strategies and their financial performance relationship.

The key goal of conducting this research is to examine the influence of sound risk management practices on profitability and stability in financial organizations.

REVIEW OF LITERATURE

Empirical studies show a high correlation between implementing effective risk management practices and financial performance. In studying institutional risk management systems, Dionne (2013) revealed that stronger risk management systems result in lower volatility in earnings. Risk identification and assessment contribute greatly to improving bank performance, as revealed by Al-Tamimi and Al-Mazrooei (2007).

Studies on Basel III reveal positive relationships between bank stability/profitability and capital adequacy/liquidity buffers respectively (BCBS, 2011). Credit risk, evaluated using non-performing assets, has emerged as an influential factor in bank financial performance (Ghosh, 2012). Liquidity risk has also been proved to be significant in influencing bank financial performance during times of financial stress.

Still, despite these findings, empirical works that aggregate several dimensions of risks into a single framework are scarce, particularly for emerging economies. Such is the purpose of this study.

RESEARCH OBJECTIVES

- To study empirically the impact of various strategies of risk management on financial performance
- To analyze the impact of credit risk management on profitability
- To determine the level of impact of liquidity risk management on financial performance
- To offer policy and managerial implications based on the findings

HYPOTHESES OF THE STUDY

The study proposes the following hypotheses:

- H_1 : There is a significant impact of credit risk management on financial performance
- H_2 : Market risk management has a significant impact on financial performance
- H_3 : Liquidity risk management has a significant impact on financial performance
- H_4 : Operational risk management significantly affects the financial performance

RESEARCH METHODOLOGY

• Research Design

The study employed a quantitative explanatory research design based on secondary data.

• Sample Selection

The population base of the study is formed of selected commercial banks and financial institutions whose operations span over five years.

• Data Sources

The secondary data was obtained from:

- Annual Reports of Financial Institutions
- Published financial statements
- Central bank and regulatory authority reports

• Variables of the Study

DEPENDENT VARIABLE

- Financial Performance
- Return on Assets (ROA)
- Return on Equity (ROE)

INDEPENDENT VARIABLES

- Need for credit: (Credit Risk • Market Risk (Interest Rate Sensitivity/Value at Risk proxy)
- Liquidity Risk (Loan-to-deposit ratio / Liquidity coverage ratio • Operational Risk (Cost to income Ratio)

Model Specification

The empirical model employed in the research is:

$$FP_{it} = \alpha + \beta_1 CR_{it} + \beta_2 MR_{it} + \beta_3 LR_{it}$$

Where:

- FP - Financial Performance
- CR : Credit Risk
- MR – Market Risk
- LR = Liquidity Risk
- OR = Operational Risk

* ε errors term

DATA ANALYSIS AND RESULTS

• Descriptive

Descriptive analysis reveals the level of variability for the risk exposure of financial institutions. On one hand, credit and liquidity risks portray significant variability on the part of financial institutions.

• Correlation

From the results of correlation analysis, the conclusion can be made that there is a negative correlation between credit risk and financial performance; liquidity management has a positive correlation with ROA and ROE.

• Regression Analysis

The regression results show that:

- Credit risk management was found to have a statistically significant negative impact on financial performance when risks were high
- Liquidity risk management has a positive and significant influence on profitability
- Market risk indicates a moderate, yet significant, relationship
- Operational Risk Efficiency Practicably Enhances Performance The model explains a significant proportion of the variation in financial performance, proving the relevance of risk management strategies implemented.

DISCUSSION OF FINDINGS

The findings confirm that these risk management strategies have a significant impact on the financial performance of financial institutions. Financial institutions that manage their credit risk show better profitability.

The results provide support for the hypothesis that integrated risk management can play an important role in the sustainability of financial performance. In addition, the study is in line with the requirements of the new Basel III banking regulations, which emphasize the need for capital and liquidity adequacy.

CONCLUSION

The empirical study shows that strategies of risk management are very important in determining financial performance for financial institutions. The most important risk management strategies are credit risk and liquidity risk management.

It concludes that financial institutions should improve enterprise-wide systems of risk management, resort to advanced forms of risk analytics, and align risk governance with strategic objectives.

IMPLICATIONS OF THE STUDY

- Managerial Implication: Strengthening credit appraisals and liquidity planning increases profitability
- Policy Implication: Regulators should encourage risk-based supervision and stress testing
- Academic Implication: Offers empirical evidence for ERM frameworks

LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

The present study is restricted to secondary data and financial institutions. However, in future studies, primary data, cross-country data, and various econometric methods may be used.

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STUDY ON ARTIFICIAL INTELLIGENCE IN THE BANKING SYSTEM: PROMISE, PITFALLS, AND THE PATH FORWARD

Ms. Manisha Ahuja

Assistant Professor, Seva sadan college of Arts, Science & Commerce

ABSTRACT

Artificial intelligence (AI) is increasingly embedded in modern banking systems, reshaping how financial institutions interact with customers, manage risk, and conduct internal operations. While AI offers clear advantages in terms of efficiency, accuracy, and scalability, it also introduces significant ethical, operational, and systemic challenges. This paper critically examines the role of AI in the banking sector, highlighting its major applications, benefits, and limitations. It further explores emerging risks such as algorithmic bias, model capacity, cybersecurity vulnerabilities, and workforce disruption. Finally, the study proposes a governance-oriented framework to support responsible AI adoption in banking while safeguarding financial stability and consumer trust.

Keywords: Artificial Intelligence, Banking, Machine Learning, Financial Technology, Risk Management, Digital Transformation

1. INTRODUCTION

The banking industry has always been shaped by technology, from the introduction of automated teller machines to the rise of internet and mobile banking. In recent years, artificial intelligence has emerged as the most transformative force in this technological evolution. Banks are no longer using AI merely as an experimental tool; it is now embedded in core business processes such as credit assessment, fraud monitoring, customer service, and regulatory compliance.

The growing availability of large datasets, improvements in computing power, and advances in machine learning algorithms have made AI systems both affordable and scalable. As a result, banks increasingly rely on AI-driven systems to make decisions that were traditionally handled by human employees. These decisions often carry high financial and social consequences, especially in areas such as loan approvals and financial inclusion.

Despite its advantages, AI in banking is not without controversy. Concerns related to transparency, accountability, data privacy, discrimination, and systemic risk have attracted attention from regulators, policymakers, and academic researchers. The objective of this paper is to provide a balanced analysis of AI in banking, focusing not only on what it enables but also on what it threatens.

METHODOLOGY

This study adopts a qualitative literature review approach. Academic research papers, policy reports, regulatory publications, and industry analyses published between 2018 and 2025 were examined. Sources include financial institutions, international organizations, regulatory bodies, and peer-reviewed journals. The aim was not to provide a technical evaluation of algorithms but to understand how AI is shaping banking practices at an institutional and systemic level.

KEY APPLICATIONS OF AI IN BANKING

AI is currently applied across nearly all banking functions. These applications can be broadly categorized into five domains.

Customer Services

Banks increasingly deploy AI-powered chatbots and virtual assistants to handle routine customer queries. These systems operate around the clock, reduce call-center workload, and improve response times. More advanced systems use natural language processing to understand user intent and personalize interactions.

Credit and Risk Assessment

Machine learning models are widely used to evaluate creditworthiness. Unlike traditional models that rely on a limited number of financial indicators, AI systems analyse large volumes of behavioural and transactional data. This allows for faster loan approvals and more granular risk profiling.

Fraud Detection and Financial Crime

AI plays a critical role in identifying fraudulent transactions and suspicious activities. Real-time anomaly detection systems can flag unusual patterns, helping banks prevent financial losses and comply with anti-money laundering regulations.

Operational Automation

AI-driven automation reduces the need for manual processing in tasks such as document verification, customer onboarding, and compliance checks. This increases efficiency and reduces operational costs.

Strategic and Market Analysis

Some banks use AI for market forecasting, algorithmic trading, and liquidity management. These systems assist decision-makers by analyzing complex market patterns that are difficult for humans to process.

ADVANTAGES OF AI IN BANKING**Increased Efficiency and Cost Reduction**

One of the strongest arguments for AI adoption is its ability to automate repetitive tasks. This reduces staffing requirements and operational expenses while improving processing speed and accuracy.

Improved Decision-Making

AI systems can identify patterns that humans may overlook, particularly in large datasets. This enhances the quality of decisions in areas such as credit scoring and investment strategies.

Enhanced Customer Experience

Personalized services improve customer satisfaction and loyalty. AI allows banks to tailor financial products based on individual behaviour, needs, and preferences.

Better Risk Management

AI improves risk monitoring by continuously learning from new data. This allows banks to detect emerging threats and adjust policies dynamically.

Support for Regulatory Compliance

Automated compliance systems help banks manage regulatory reporting and detect potential violations more efficiently than traditional manual processes.

CHALLENGES AND RISKS

Despite these benefits, AI introduces several critical challenges.

Lack of Transparency

Many AI models operate as “black boxes,” meaning their internal logic is difficult to interpret. This creates problems for accountability, especially when customers challenge automated decisions.

Bias and Discrimination

If training data contains historical bias, AI systems may reinforce existing inequalities. This is particularly concerning in credit allocation, where biased models can exclude vulnerable populations.

Data Privacy and Security

AI systems require large amounts of personal data. Poor data governance increases the risk of breaches, misuse, and regulatory violations.

Systemic Risk

When multiple banks use similar AI models, collective behavior may become synchronized. This increases the risk of market instability and amplifies financial shocks.

Workforce Displacement

Automation reduces demand for clerical and administrative roles. While new technical roles may emerge, many employees face reskilling challenges.

Legal and Ethical Uncertainty

AI regulations are still evolving. Banks must operate in uncertain legal environments where liability for algorithmic decisions is not clearly defined.

Governance and Control Framework

To manage these risks, banks must implement structured governance mechanisms.

Human Oversight

Critical decisions should never be fully automated. Human review mechanisms must be maintained for high-impact processes such as loan rejections.

Model Accountability

Banks should maintain clear documentation of model design, training data, and performance metrics.

Explainable AI

Where possible, interpretable models should be preferred over opaque systems, especially for customer-facing applications.

Data Governance

Strong policies must regulate data collection, storage, usage, and sharing.

Regulatory Alignment

Banks must ensure AI systems comply with both existing financial regulations and emerging AI-specific laws.

Workforce Transition

Organizations should invest in training programs to help employees adapt to new digital roles.

Future Outlook

AI in banking is still evolving. Future systems will likely be more autonomous, adaptive, and integrated into decision-making structures. However, the long-term success of AI adoption depends on trust. Without transparency, ethical safeguards, and regulatory cooperation, AI risks undermining the very stability it seeks to improve.

Further research is needed to measure real-world impacts of AI on financial inclusion, economic inequality, and systemic resilience.

8. CONCLUSION

Artificial intelligence represents both an opportunity and a challenge for the global banking system. It offers unprecedented efficiency, personalization, and analytical power. At the same time, it introduces serious concerns related to fairness, accountability, security, and social impact. AI should not be viewed as a replacement for human judgment but as a tool that enhances it. Responsible adoption requires not only technical excellence but also ethical awareness, institutional discipline, and regulatory foresight.

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THE ROLE AND NEED OF ARTIFICIAL INTELLIGENCE IN SECONDARY EDUCATION OF THANE DISTRICT (MAHARASHTRA)

¹Ms Kataria Manisha and ²Dr Ankamreddi Rama Mohan

Research scholar, Sandip University (Nashik)

Assistant professor, school of commerce and management studies, Sandip University (Nashik)

ABSTRACT

Artificial Intelligence (AI) is playing an increasingly influential role in reshaping educational practices worldwide and is gaining importance in India's secondary education system. AI-driven technologies have the potential to nurture essential 21st-century competencies such as critical thinking, problem-solving, digital literacy, and adaptive learning. Integrating AI into secondary education can enhance teaching effectiveness and provide students with more personalized and engaging learning experiences. This study explores the need for AI adoption in secondary schools in Thane District, Maharashtra, with a focus on improving pedagogical outcomes, assessing teacher preparedness, and identifying implementation challenges within a diverse and developing educational environment. A mixed-method approach was employed, combining teacher surveys, interviews with school administrators, and analysis of relevant educational policies and initiatives. The findings suggest that AI tools can significantly support individualized learning pathways, deliver timely academic feedback, and reduce routine administrative responsibilities for teachers. Exposure to AI technologies also helps students build digital competencies that are increasingly required in higher education and future employment sectors. However, the study identifies several key barriers, including inadequate digital infrastructure, limited access to technological resources, insufficient professional training for teachers, and disparities in technology availability among students from different socio-economic backgrounds. The research concludes that AI integration at the secondary level is essential for enhancing educational quality, relevance, and equity. Successful implementation will require strategic investment in infrastructure, structured teacher training programs, and coordinated collaboration among policymakers, educational institutions, and stakeholders to prepare learners for participation in an evolving digital society.

Keywords: Artificial Intelligence, Secondary Education, Thane District, Digital Learning, Teacher Readiness, Educational Technology.

INTRODUCTION

Artificial Intelligence (AI) has long been present in educational settings, but recent advances have significantly expanded its visibility, accessibility, and practical applications in schools. These developments are creating new possibilities for enhancing how students learn and how teachers and administrators manage instructional processes. In Thane district, Maharashtra—a rapidly growing region—secondary education continues to rely largely on traditional lecture-based instruction. The integration of AI technologies offers opportunities to improve academic achievement, bridge the gap between current competencies and future workforce requirements, and prepare students for participation in a technology-driven economy.

AI can be described as the ability of computer systems to perform tasks that typically require human intelligence, such as language processing, pattern recognition, and decision-making through the analysis of large volumes of data (Coursera Staff, 2024). In educational contexts, AI-supported tools are contributing to improved learning outcomes while also easing administrative burdens on educators (Luckin et al., 2016). However, the success of AI integration in classrooms depends greatly on teachers' confidence, preparedness, and openness to using new technologies (ZawackiRichter et al., 2019). Educators' competence in applying AI-based tools therefore plays a central role in maximizing student benefits, highlighting the importance of structured training and continuous professional development initiatives (Paie, 2025).

OBJECTIVES

- To **understand the necessity** of AI integration in Thane secondary education.
- To **measure teacher and school preparedness** and awareness levels.
- To **determine adoption hurdles** and potential advantages of AI use in the specified secondary schools.

LITERATURE REVIEW

- **Pathak & Waghmare (2024)** explored how Artificial Intelligence might be used in India's secondary education. They emphasized that AI has the capacity to elevate teaching standards, customize educational journeys, and help learners achieve improved academic results. They also identified significant impediments,

such as deficient policies and inadequate school infrastructure, which could impede adoption unless addressed through comprehensive educational strategies.

- **Suryakant (2025)** executed a questionnaire-based investigation into secondary educators' familiarity with AI and discovered considerable variations across different teacher demographics. The research revealed that instructors in private institutions and urban areas possessed greater AI awareness compared to their counterparts in government and rural schools, highlighting unequal access to AI knowledge and readiness. This study stresses the necessity for targeted professional development for teachers before AI can be successfully integrated into educational settings.
- **Ramelan, Sugiarti & Winarjo (2025)** performed a methodical review of existing literature regarding AI implementation in secondary schools, determining that adaptive learning and customized curricula constitute some of the most prominent research areas. Their examination indicated that while AI research is expanding rapidly, a primary focus remains on personalized learning and adaptive technologies rather than widespread classroom integration—illustrating discrepancies between research priorities and actual instructional application.
- **Apriliani & Rachman (2025)** analyzed existing research on integrating AI into adaptive learning systems for secondary education. They highlighted that AI platforms can customize instructional content and delivery speeds according to individual student profiles, but also pointed out ongoing obstacles like insufficient digital infrastructure, inconsistent teacher skill levels, and inadequate government backing.
- **Li, Yan & Zeng (2025)** investigated the function of AI in providing inclusive education, finding that AI tools have enhanced involvement among diverse student populations, but that educator instruction and theoretical frameworks were essential for successful execution. Their review observed that while AI has demonstrated benefits in academic results and student engagement, the barriers related to training and ethical considerations remain substantial.
- **Ng, Su, Leung & Chu (2024)** reviewed studies concerning AI literacy within secondary schools, highlighting instructional strategies and difficulties linked to incorporating AI into fundamental teaching activities. They underscored that AI literacy necessitates not just the tools, but also a revision of the curriculum and assessment methods that adequately measure AI competencies.
- **Alneyadi et al. (2023)** explain that AI in education refers to the use of technologies such as machine learning and natural language processing to improve learning experiences. Khan et al. (2022) note that AI systems rely on algorithms to analyze data, recognize patterns, and make predictions, enabling educators to adapt instruction to meet individual student needs.
- **Shrivastava et al. (2023)** emphasize that one of the major benefits of AI in education is personalized learning, which allows students to learn at their own pace and according to their learning preferences, leading to improved academic outcomes. Furthermore, intelligent tutoring systems, chatbots, and automated grading tools help save teachers' time while providing consistent and timely feedback.
- **Jarrah, Wardat, and Gningue (2022)** point out several challenges related to AI adoption in education, including privacy and security concerns, high costs, lack of trust, and the risk of bias in algorithms. Similarly, AlArabi, Tairab, Wardat, Belbase, and Alabidi (2022)

ADVANTAGES OF AI IN SECONDARY EDUCATION

• Enhancing Educational Quality and Access

The use of AI in secondary education supports more flexible and individualized learning opportunities while reducing teachers' administrative workload. Intelligent systems provide timely academic insights and contribute to more dynamic, technology-enriched classrooms.

• Personalized Learning Experiences

AI-based platforms adapt instructional content according to each learner's pace and capability, offering additional support to those who struggle and advanced challenges to highperforming students.

• Rapid Evaluation and Feedback

Automated assessment tools help students receive prompt information about their performance, allowing them to recognize learning gaps and make improvements more efficiently.

• Improved Teacher Productivity

By assisting with grading, attendance management, and data analysis, AI enables teachers to dedicate more time to interactive teaching and student mentorship.

- **Greater Student Engagement**

The inclusion of simulations, gamified lessons, and AI-supported virtual assistants makes classroom learning more interactive and helps maintain student interest.

- **Data-Informed Decision Making**

AI applications process large volumes of learner data to detect patterns, predict potential difficulties, and support early academic interventions.

- **Support for Diverse Learners**

Features such as speech-to-text, language translation, and assistive reading tools help learners with disabilities or language challenges access educational content more effectively.

- **Development of Future-Oriented Skills**

Familiarity with AI tools promotes digital literacy, analytical thinking, and technical skills needed in modern career environments.

- **Continuous Learning Assistance**

AI-powered chatbots and virtual tutors provide academic guidance beyond school hours, enabling students to clarify doubts and continue learning independently.

RESEARCH METHODOLOGY

Research Design

This study employed a descriptive survey research design to examine the need and role of Artificial

Intelligence (AI) in secondary education. Data were collected from teachers and students in the Thane district of Maharashtra. The study aims to understand the current level of awareness, usage, benefits, and challenges related to the integration of AI in the teaching–learning process.

Population of the study

Participants for this study included secondary school instructors and learners situated in the Thane district of Maharashtra, focusing on stakeholders directly participating in the academic teaching– learning process.

Sample and sampling technique

A total of **100 respondents** were selected for the study, which included:

Students from secondary classes

Teachers teaching at the secondary level

Sample size determination

To ensure reliability of the data, the margin of error for the sample size was calculated using the standard formula for estimating proportions in a large population.

$$E = Z \sqrt{\frac{p(1-p)}{n}}$$

Where:

- **E** = Margin of error
- **Z** = Z-score corresponding to the confidence level (1.96 for 95% confidence)
- **p** = Assumed population proportion (0.5 used for maximum variability)
- **n** = Sample size

$$E = 1.96 \sqrt{\frac{0.5(1-0.5)}{100}}$$

$$E = 1.96 \sqrt{\frac{0.25}{100}}$$

$$E = 1.96\sqrt{0.0025}$$

$$E=1.96 \times 0.05$$

$$E=0.098$$

Thus, the margin of error is approximately $\pm 9.8\%$ at a **95% confidence level**. This indicates that the survey results are expected to represent the true population values within a 9.8% range.

TOOLS FOR DATA COLLECTION

Two tools were used:

1. Questionnaire

A structured questionnaire was prepared for students and teachers. It included:

- Awareness of AI
- Use of AI tools in learning/teaching
- Perceived benefits of AI
- Challenges in using AI

2. Interview

Short interviews were conducted with selected teachers to gain deeper insights into:

- Practical use of AI in classrooms
- Difficulties faced
- Suggestions for improvement

Data were collected through questionnaires distributed to both students and teachers, along with personally conducted and recorded interviews with selected teachers.

DATA COLLECTION PROCEDURE

Data were collected through questionnaires distributed to both students and teachers, along with personally conducted and recorded interviews with selected teachers.

FINDINGS

Table 1: Age Distribution of Respondents

Age Group	Frequency (n)	Percentage (%)
12–20	50	50%
21–30	22	22 %
31–40	7	7%
Above 40	21	21%
Total	100	100%

Table 2: Awareness of AI in Education

Response	Frequency (n)	Percentage (%)
Yes	80	80%
No	20	20%
Total	100	100%

Table 3: Level of Awareness of AI in Education

Awareness Level	Frequency (n)	Percentage (%)
Very High	15	15%
High	22	22%
Moderate	38	38%
Low	11	11%
Very Low	14	14%
Total	100	100%

Table 4: Use of AI Tools in Schools (Students' Response)

Response	Frequency (n)	Percentage (%)
Yes	32	32%
No	48	48%
Not Sure	20	20%
Other/Private Use	1	1.0%
Half	14	14%
Total	100	100%

Table 5: Use of AI Tools in Schools (Teachers' Response)

Response	Frequency (n)	Percentage (%)
Yes	34	34%
No	47	47%
Not Sure	32	32%
Total	100	100%

CONCLUSION

This study of 100 participants highlights a high general awareness of AI (80%) in secondary education, yet reveals limited practical implementation, with nearly half of students and teachers reporting no active use of AI tools in schools. While 37% report high awareness, 38% have only moderate knowledge, signaling a gap in comprehensive understanding.

KEY FINDINGS

- Demographics:** The survey was driven by a majority (50%) of 12–20-year-olds, alongside educators and other adults.
- Awareness vs. Usage:** Despite 80% awareness, only 32% of students and 34% of teachers confirmed AI usage in schools.
- Barriers:** The findings suggest that inconsistent exposure, lack of, or limited infrastructure, and the need for, or lack of, teacher training hinder integration.

While awareness is high, AI in secondary education is not yet systematically adopted. The study emphasizes the need for institutional support, policy, and training to bridge the gap between AI awareness and classroom implementation.

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A STUDY ON SUSTAINABLE AI AWARENESS AND READINESS UNDER INDIA'S INDIAAI MISSION: A POLICY PERSPECTIVE

¹Dr.Natika Poddar and ²Ms. Mahek Chudasama¹Associate professor, St. Francis Institute of Management and Research²MMS, St. Francis Institute of Management and Research**ABSTRACT**

This study examines the concept of Sustainable AI within the context of India's IndiaAI Mission, adopting a policy and empirical perspective. While India ranks 3rd globally in AI vibrancy, concerns are emerging regarding the environmental implications of rapid AI expansion, particularly in energy consumption, carbon emissions, water usage, and e-waste generation. Through a descriptive research design, the study combines secondary policy analysis of the IndiaAI Mission with primary survey data from 192 respondents, including academicians, corporate professionals, and students. Comparative analysis with global benchmarks such as the EU AI Act and U.S. AI Executive Orders reveals that although the IndiaAI Mission promotes innovation, compute access, and skill development, it lacks binding environmental safeguards such as renewable energy mandates, Power Usage Effectiveness (PUE) standards, carbon disclosure norms, and lifecycle e-waste regulations.

Survey findings indicate moderate awareness of the IndiaAI Mission but limited clarity regarding its sustainability provisions. A majority of respondents support the inclusion of renewable energy targets, yet organizational readiness remains weak, with limited carbon tracking, unclear ESG integration, and absence of dedicated green AI budgets. Hypothesis testing confirms no significant gender difference in awareness levels and no significant association between corporate sustainability practices and readiness to adopt IndiaAI sustainability guidelines.

The study concludes that embedding sustainability-by-design within India's AI governance framework is essential to align AI growth with India's Net-Zero 2070 commitments and ensure that technological advancement does not compromise environmental sustainability.

Keywords: Sustainable AI; Green AI; IndiaAI Mission; Environmental Governance; AI Policy; Net-Zero 2070; Renewable Energy; Data Centers; ESG Reporting; AI Sustainability Readiness.

INTRODUCTION

Sustainable AI refers to the development and deployment of artificial intelligence systems designed to minimize environmental impact throughout their complete lifecycle—from hardware manufacturing and data processing through model training, inference operations, and data center management to electronic waste disposal. This approach employs three strategic pillars: hardware optimization using energy-efficient processors like TPUs and sustainable materials, model efficiency through techniques such as pruning, quantization, distillation, and TinyML that achieve 50-90% energy reductions, and data center sustainability targeting Power Usage Effectiveness (PUE) ratios below 1.3 with renewable energy sourcing. Its importance has become critical during the current AI boom, as data centers are projected to consume 1,000 TWh globally by 2026—equivalent to Japan's total electricity demand—while the technology sector already emits 4% of worldwide greenhouse gases, surpassing aviation. Individual models like GPT-3 require 1,300 MWh for training, 5.4 million liters of water for cooling, and generate 500 tonnes of CO₂, with generative AI threatening 1.2-5 million tonnes of e-waste by 2030. Sustainable AI enables continued innovation while meeting regulatory requirements, attracting green foreign investment, preventing stranded assets in coal-dependent economies, and aligning national AI strategies with net-zero climate commitments essential for long-term technological leadership.

PROBLEM STATEMENT

The IndiaAI Mission democratizes AI but omits binding environmental safeguards, unlike EU AI Act mandates. Data centers exacerbate coal-dependent energy, water stress and e-waste, potentially mirroring GenAI's 1.2-5M tonnes globally by 2030. Without primary validation, India's "AI for All" risks "AI harming All," clashing with net-zero 2070 goals.

NEED OF STUDY

The IndiaAI Mission's compute expansion, without environmental safeguards, risks straining coal-dependent grids and water resources. This study offers an initial empirical analysis of AI's environmental impact, net-zero alignment, and awareness and adoption of sustainable AI among academicians and professionals to support a sustainable Viksit Bharat pathway.

OBJECTIVES OF THE STUDY

1. To assess the current state of Sustainable AI practices in India in comparison with global benchmarks.
2. To examine the extent to which environmental sustainability is incorporated within the IndiaAI Mission framework.
3. To analyse the level of awareness of the IndiaAI Mission and Sustainable AI among academicians and professionals.
4. To evaluate the readiness of organisations and stakeholders to adopt Sustainable AI practices in India.
5. To identify key barriers to the effective implementation of Sustainable AI under the IndiaAI Mission.

RESEARCH METHODOLOGY

Design: Descriptive Research

Data: Primary survey and Secondary policy analysis

Primary: Structured questionnaire (Likert scale) targeting Academician and practitioners

Target size : Academicians 100 and practitioners 50

Secondary: Content analysis of IndiaAI Mission documents vs global benchmarks framework

Analysis: Descriptive statistics

Tools: Google Forms, Excel/SPSS

REVIEW OF LITERATURE

1) Golla, S., & Kumar, T. S. (2025). A STUDY ON ARTIFICIAL INTELLIGENCE FOR A SUSTAINABLE FUTURE IN INDIA: OPPORTUNITIES AND CHALLENGES.

The literature identifies AI as a major driver of sustainable development in India, improving energy efficiency, agriculture, and urban resource management. However, challenges such as high costs, data gaps, ethical issues, and uneven infrastructure remain, highlighting the need for energy-efficient AI models and better stakeholder coordination.

2) Bolón-Canedo, V., Morán-Fernández, L., Cancela, B., & Alonso-Betanzos, A. (2024). A review of green artificial intelligence: Towards a more sustainable future.

The literature describes Green AI as a sustainable approach that delivers effective outcomes using less energy and computing power. It highlights both AI for environmental applications and energy-efficient AI design, stressing the need to measure energy use and support responsible policies for long-term sustainability

3) Hacker, P. (2024). Sustainable AI regulation.

Research highlights that current AI regulations largely overlook environmental sustainability, despite the high energy and water use of large AI models. The literature calls for sustainability to be embedded in technology governance through sustainability-by-design, coordinated regulation, and limits on resource-intensive AI, with similar frameworks applicable to technologies like blockchain and the metaverse.

4) Behera, B., Behera, P., Pata, U. K., Sethi, L., & Sethi, N. (2025). Artificial intelligence-driven green innovation for sustainable development: Empirical insights from India's renewable energy transition.

Studies show that AI and green technology innovation contribute more to sustainable growth in India than renewable energy alone. AI not only drives green growth directly but also strengthens renewable energy impact, highlighting the need to align AI with energy policies, institutions, and financing to achieve sustainability and SDG goals.

5) Van Wynsberghe, A. (2021). Sustainable AI: AI for sustainability and the sustainability of AI

The literature emphasizes that sustainability should involve not only using AI for environmental goals but also making AI itself sustainable. It focuses on the full lifecycle of AI systems, reducing environmental impact and resource use while promoting socially responsible and eco-friendly AI development.

6) Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., ... & Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals.

Research shows that AI's rapid expansion can significantly support the Sustainable Development Goals, though it may also create risks if mismanaged. The literature highlights the need for strong regulation to ensure transparent, safe, and ethical AI use for sustainable development.

- 7) Wu, C. J., Raghavendra, R., Gupta, U., Acun, B., Ardalani, N., Maeng, K., ... & Hazelwood, K. (2022). **Sustainable ai: Environmental implications, challenges and opportunities.**

The literature highlights the growing environmental impact of AI, examining emissions from data use, algorithms, and hardware across the full lifecycle. It finds that better hardware–software design and large-scale optimization can significantly reduce AI’s carbon footprint and support more sustainable AI development

- 8) Tabbakh, A., Al Amin, L., Islam, M., Mahmud, G. I., Chowdhury, I. K., & Mukta, M. S. H. (2024). **Towards sustainable AI: a comprehensive framework for Green AI.**

The literature notes that while AI offers major benefits, it also raises energy use and environmental concerns. Green AI is presented as a framework that balances performance with resource efficiency through optimized models, efficient algorithms, energy-saving hardware, and sustainable data centers to support global sustainability goals.

- 9) Martini, B., Bellisario, D., & Coletti, P. (2024). **Human-centered and sustainable artificial intelligence in industry 5.0: Challenges and perspectives.**

The literature presents human-centered AI as central to Industry 5.0 and the circular economy, supporting sustainable, customized production and smarter supply chains. It stresses integrating social, technical, and sustainability aspects, while highlighting the need for thoughtful regulation to manage its wider impacts.

- 10) Goralski, M. A., & Tan, T. K. (2020). **Artificial intelligence and sustainable development.**

The literature shows that AI is transforming business, strategy, and public policy with major implications for sustainability. While it supports progress toward the SDGs, it also poses risks like inequality and environmental stress, highlighting the need for responsible leadership and guided AI adoption.

- 11) Poswal, S. (2025). **India's AI Strategic Paralysis: The 84-Month Freeze That Cost a Generation.**

Research shows that India’s 84-month pause in AI policy slowed research, curriculum updates, and talent retention during a key global AI shift. Compared to faster progress abroad, the delay highlights the need for urgent policy reforms, updated strategy, and stronger talent and research development.

- 12) Mahesh, K. M., Aithal, D. S., & Sharma, K. R. S. (2025). **A Case Study of Seven Pillars India AI Mission: Its Impact on 7’S Framework: For Viksit Bharat.**

The India AI Mission, launched in March 2024, promotes AI innovation through public–private collaboration, focusing on skills, research, and key technologies, while initiatives like innovation centers and AI labs aim to build a sustainable and inclusive AI ecosystem in India.

DATA ANALYSIS

Objective 1

Sustainable AI focuses on developing the AI sector responsibly by reducing environmental impact at every stage—from hardware sourcing and data centers to model training, deployment, and e-waste management. It emphasizes lowering energy and resource use in line with global net-zero goals, often referred to as eco-friendly or green AI.

Metric	India	Global Leader	World Average
AI Rank	3rd	US (1st)	-
PUE	1.4	Sweden (1.1)	1.55
DC RE %	8%	Sweden (100%)	20%
DC Emissions	4-8% grid by 2030	EU (regulated)	1-1.5% global

India ranks 3rd globally in the Stanford AI Vibrancy Index 2025, reflecting strong AI adoption, but lags in sustainable AI infrastructure. Data center capacity has reached 1.5 GW—led by Mumbai—and may grow to 10 GW by 2030, potentially consuming 15% of national electricity. Sustainability gaps persist, with higher PUE levels and low renewable energy use compared to global standards. Despite strong corporate awareness and AI climate initiatives, weak environmental regulations highlight the need for policy alignment to support green AI growth and net-zero goals.

Objective 2

The IndiaAI Mission, launched in March 2024 with ₹10,372 crore funding, is built on seven pillars but lacks explicit environmental safeguards. Unlike global frameworks such as the EU AI Act and the U.S. AI Executive Order, which embed sustainability from the design stage, India’s approach focuses more on compute access and

innovation. As a first major AI policy amid rapid data center growth, this tech-catch-up priority helps explain gaps in integrating climate and environmental considerations.

Global Frameworks

EU AI Act employs a risk-based pyramid: prohibited AI (e.g., social scoring) at top; high-risk systems (e.g., hiring algorithms) require Environmental Impact Assessments (EIA), PUE mandates (<1.3 ratio of total energy to IT energy), and renewable sourcing (Art. 10). PUE matters because data centers average 1.5 globally—every 0.1 drop saves 4% energy; Sweden hits 1.1 via cold climate/free cooling. U.S. order demands federal agencies report AI carbon footprints, spurring Google's 24/7 carbon-free energy by 2030.

European Union		United States
		
AI Law	AI Act	AI Environmental Impacts Act
Status	Entry into force (Aug 1, 2024)	Under review
Requirement	- Require disclosure on energy consumption and assessment of energy efficiency - Encourage practices that minimize energy usage and material impact, e.g., optimizing data centers, sustainable hardware	- Mandate a study on the environmental effects of AI technologies - Create a consortium to address impacts of AI - Establish a voluntary system for companies to report environmental data on AI

Source: European Commission, Office of Senator Markey, and Krungsri Research

Pillar-by-Pillar Gap Analysis Under IndiaAI mission policy

Pillar	IndiaAI Policy	Global Benchmark	Why Gap Exists (Nascency)	Damage from Gap
1. Compute Capacity (10K GPUs)	Subsidized hardware; no green specs	EU: PUE<1.3 + RE 60%; U.S.: Carbon reporting	Tech catch-up prioritized (India 1.5GW vs U.S. 20GW DCs) over infra maturity	Grid strain: 10GW DCs by 2030 = 100M tons CO2/year (coal-heavy); misses ₹200bn green DC market eco-business
2. Datasets Platform (AIKosh)	Data aggregation; no storage rules	EU: Low-carbon cloud mandates	Data scarcity focus (vs U.S. abundance) ignored training's 1,300MWh/model cost currentaffairs.adda247	Water waste: AI cooling = 1L/electricity unit; 360M liters Delhi crisis risk
3. Innovation Centre	R&D funding; no efficiency criteria	Global: Pruning/TinyML grants (90% compute cut)	Startup boom (10K+ AI firms) lacked ESG vetting	Inefficient models: Locks 50% unnecessary emissions vs optimized rivals
4. Startup Financing (₹500cr)	Risk capital; no ESG linkage	U.S. SBA: Green AI loans	Funding drought (India startups raise 1/10th U.S.) skipped sustainability filters	Locked-out capital: Global VCs demand ESG; India misses \$50bn climate tech knowledge-sourcing
5. FutureSkills (1M trained)	AI literacy; no green modules	Singapore: Mandatory sustainable AI certs	Talent shortage (1% global AI PhDs) over skill depth	Workforce blindspot: 96% execs see AI-sustainability link, untrained = missed climate apps [IBM]indiaai
6. Application	Sector apps	EU: High-risk	Application rush (health/agri	Unintended emissions:

Development	(climate included); no EIA	AI impact audits	pilots) skipped risk tiers	Climate models ironically guzzle compute without offsets
7. Safe & Trusted AI	Bias/privacy focus; ignores e-waste	UNEP: Lifecycle rules (5M tons e-waste by 2030) wesr.unep	Ethics-first (post-ChatGPT) neglected hardware end-life	Toxic legacy: Rare earth dumping pollutes; no recycling = health/grid risks

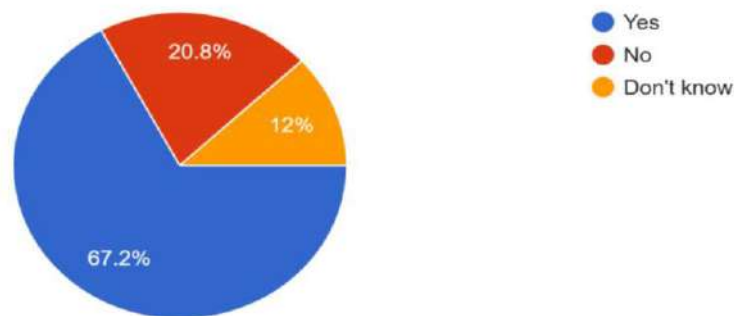
Objective 3, 4 &5

DATA ANALYSIS FROM PRIMARY DATA

The study comprised 181 respondents, including 94 females (51.9%) and 87 males (48.1%). Occupationally, the sample included 66 students (36.5%), 62 corporate professionals (34.3%), and 53 academicians (29.3%). Age-wise, 94 respondents (51.9%) were aged 18–30, 53 (29.3%) were 30–45, 31 (17.1%) were 45–60, and 3 respondents (1.7%) were above 60 years.

Does IndiaAI Mission require renewable energy targets?

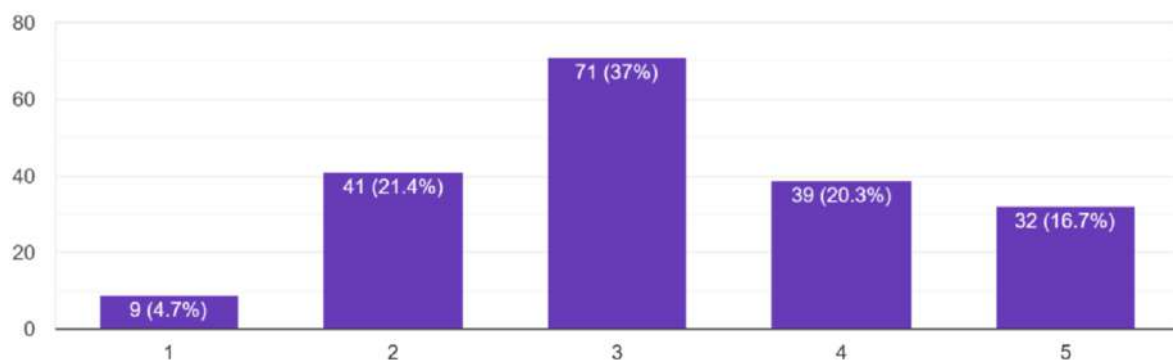
192 responses



Out of 192 respondents, 67.2% agreed that the IndiaAI Mission requires renewable energy targets, while 20.8% disagreed and 12% were unsure, indicating overall support with some lack of clarity among respondents.

Rate your knowledge of IndiaAI Mission's 7 pillars

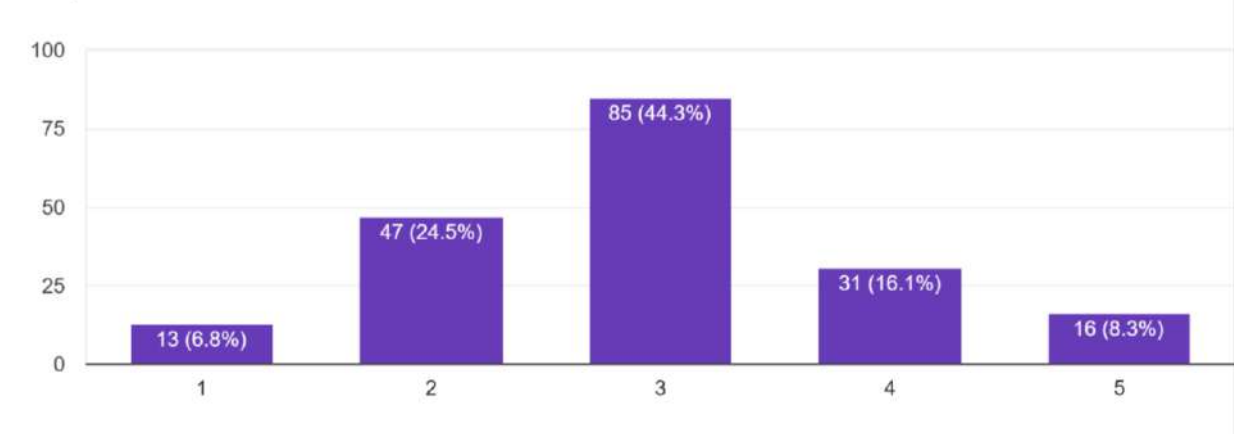
192 responses



Out of 192 respondents, most rated their knowledge of the IndiaAI Mission's 7 pillars as moderate, with the largest share selecting level 3 (37%), indicating average awareness.

IndiaAI Mission has binding environmental regulations.

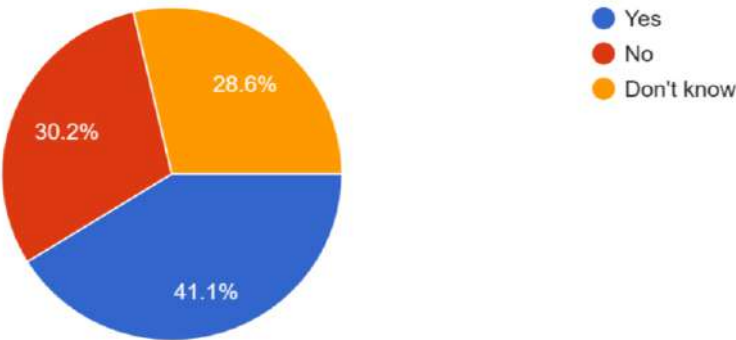
192 responses



44.3% (85) selected the mid-point, showing moderate agreement that the IndiaAI Mission has binding environmental regulations.

I know IndiaAI Mission's total budget allocation.

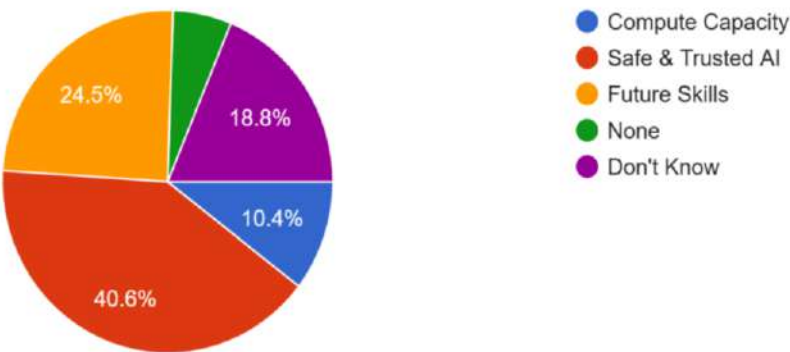
192 responses



41.1% stated they know the IndiaAI Mission’s total budget allocation, while 30.2% said they do not and 28.6% were unsure, indicating mixed awareness levels.

Which IndiaAI pillar focuses on sustainability?

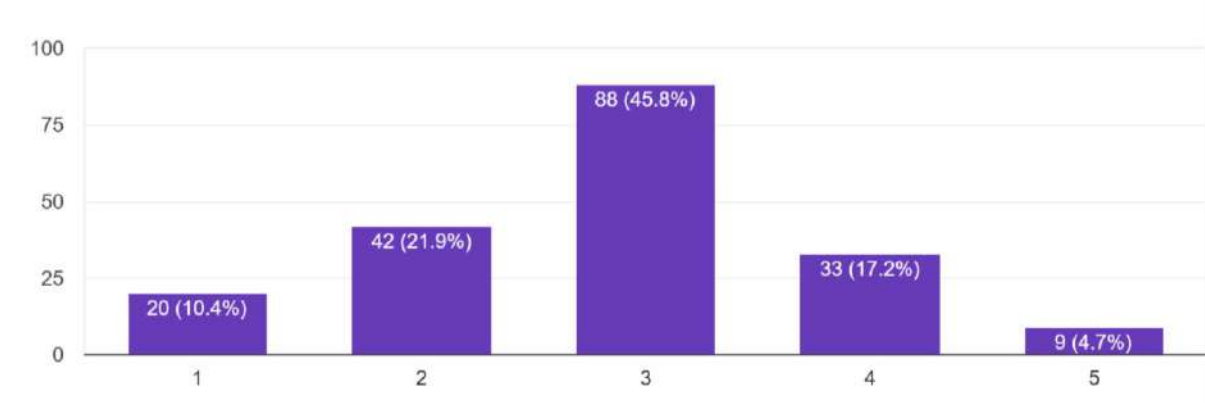
192 responses



Out of 192 respondents, 40.6% identified Safe & Trusted AI as the pillar linked to sustainability.

IndiaAI Mission aligns with net-zero 2070 goals.

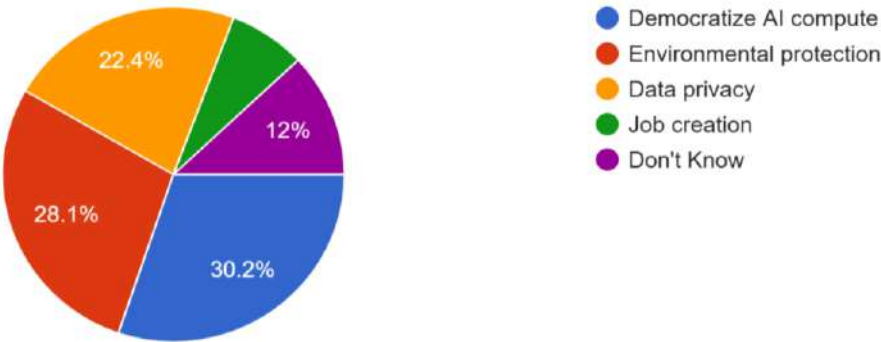
192 responses



Out of 192 respondents, 45.8% (88) selected the neutral mid-point, indicating moderate agreement that the IndiaAI Mission aligns with India’s net-zero 2070 goals.

Primary purpose of IndiaAI Mission

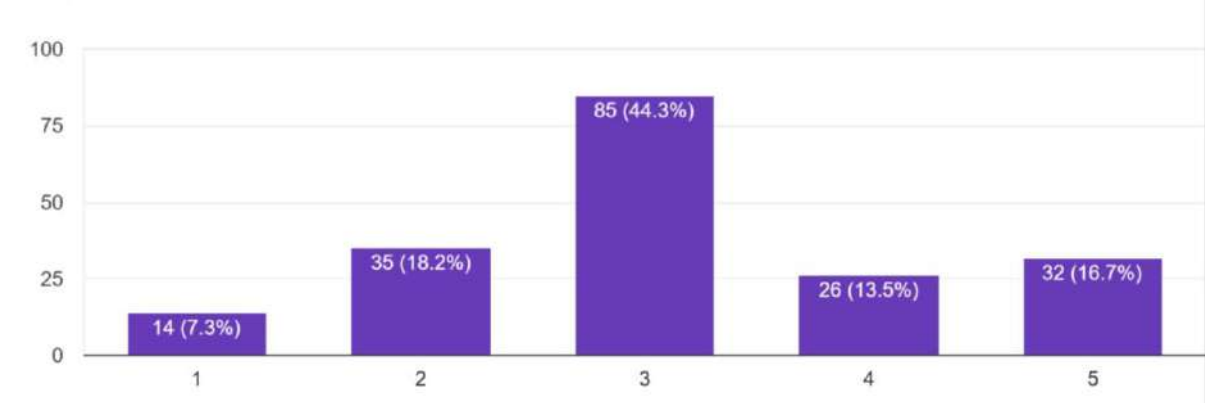
192 responses



30.2% identified democratizing AI compute as the primary purpose of the IndiaAI Mission.

How accessible is IndiaAI Mission documentation?

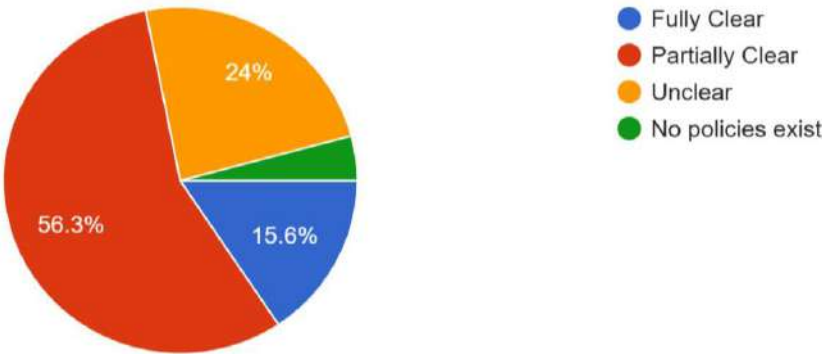
192 responses



44.3% of 192 respondents rated India AI Mission documentation accessibility as average.

IndiaAI environmental policies are clearly defined.

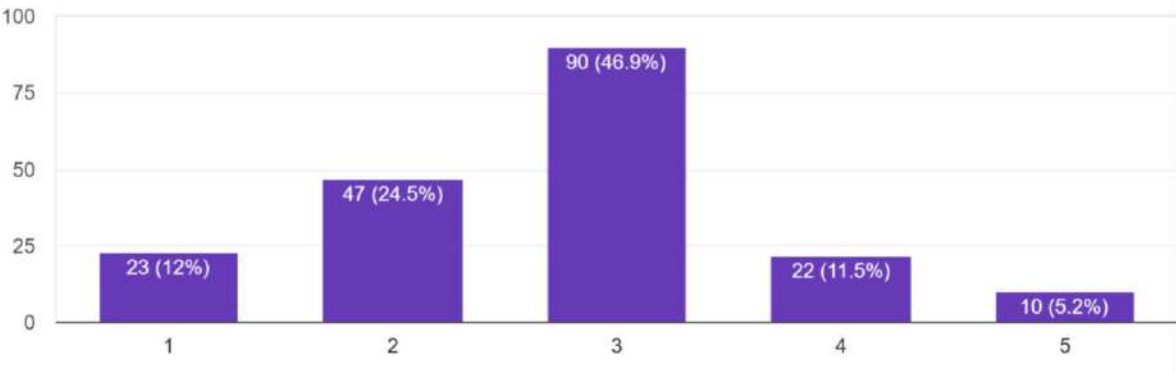
192 responses



Out of 192 respondents, most feel IndiaAI’s environmental policies are only partially clear (56.3%).

IndiaAI Mission supports sustainable AI development.

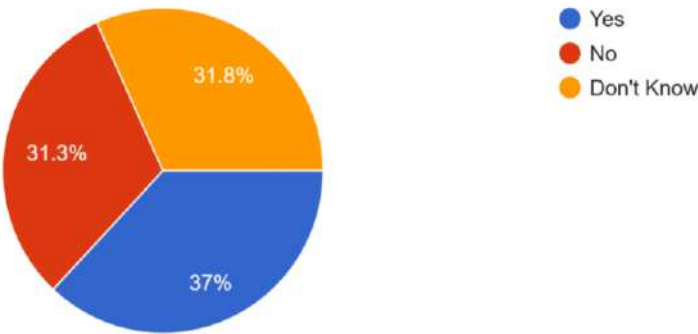
192 responses



Among 192 respondents, most chose the neutral midpoint 3 (46.9%), showing uncertainty about whether the IndiaAI Mission supports sustainable.

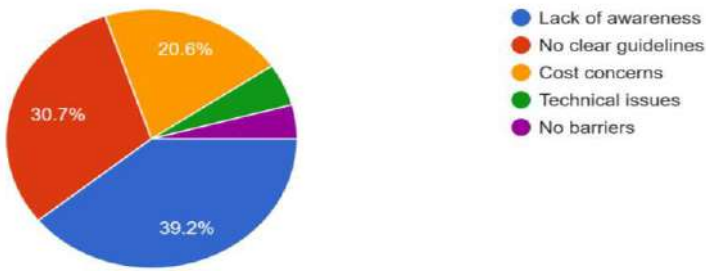
Current IndiaAI policies meet global standards (EU AI Act).

192 responses



From 192 responses, opinions are split: 37% believe IndiaAI policies meet global standards.

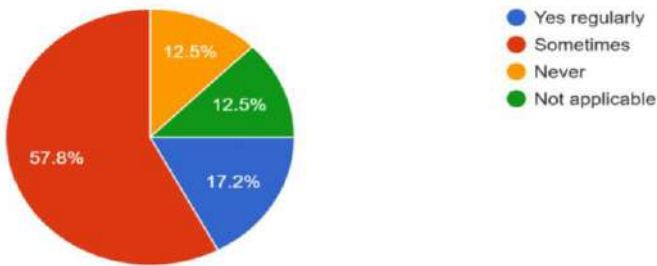
Biggest barrier to IndiaAI policy adoption
189 responses



From 189 respondents, the biggest barrier is lack of awareness (39.2%), followed by no clear guidelines (30.7%) and cost concerns (20.6%).

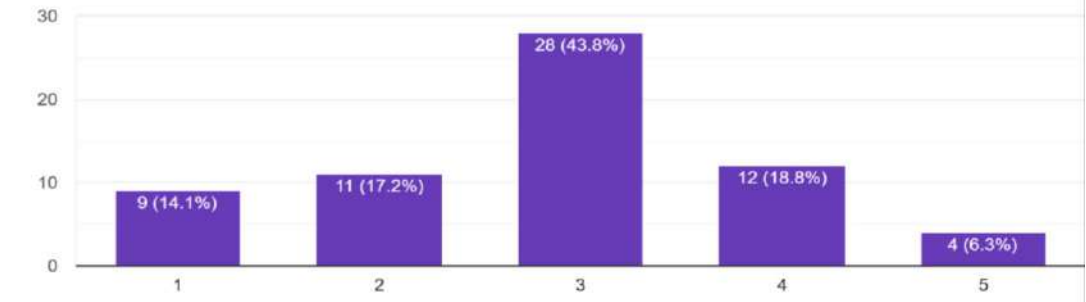
CORPORATE PROFESSIONAL SPECIFIC QUESTIONS

Does your organization follow IndiaAI guidelines?
64 responses



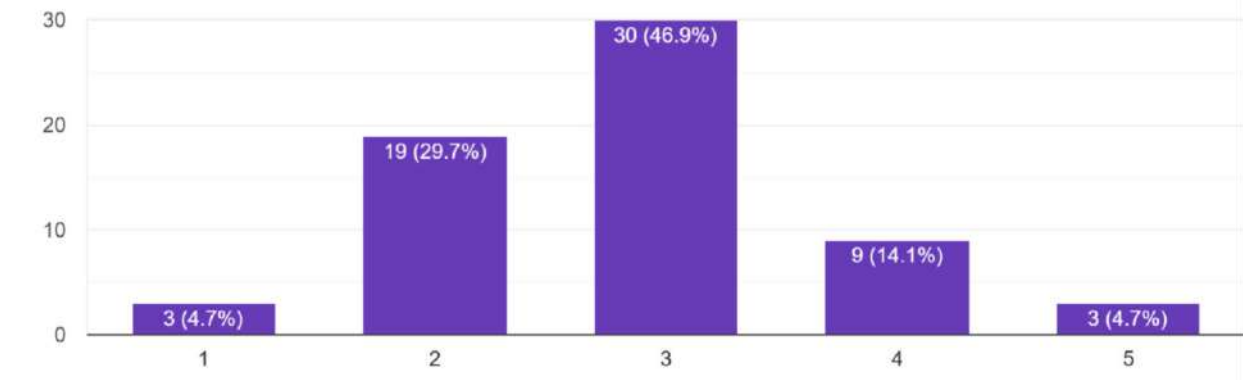
Out of 64 responses, most organizations follow IndiaAI guidelines only sometimes (57.8%).

IndiaAI Mission needs stronger environmental safeguards.
64 responses



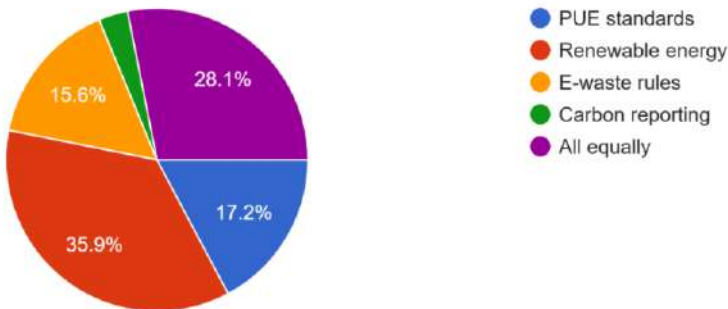
From 64 respondents, most selected the neutral point 3 (43.8%), showing uncertainty.

IndiaAI Mission influences your AI decisions.
64 responses



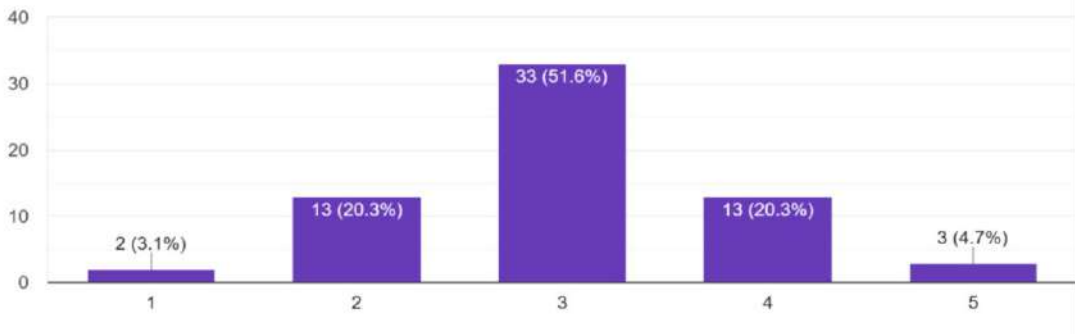
46.9% (30) selected the mid-point, showing a neutral view that the IndiaAI Mission influences AI decisions.

IndiaAI should prioritize which sustainability measure?
64 responses



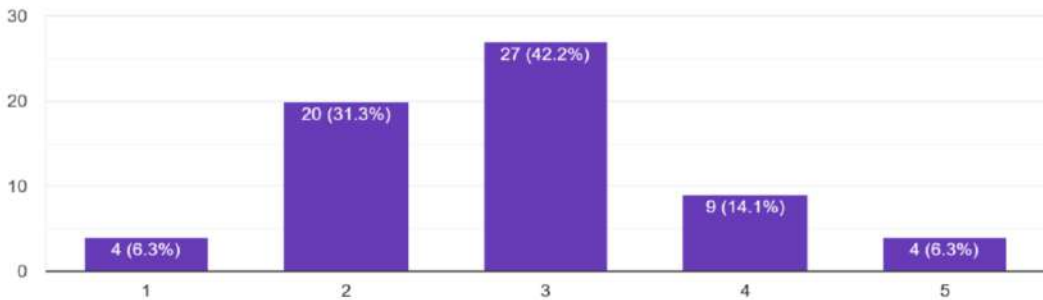
35.9% chose renewable energy as the priority, followed by 28.1% saying all equally, then 17.2% for PUE standards and 15.6% for e-waste rules, with very few for carbon reporting 3.2%.

Rate IndiaAI Mission's environmental policy strength:
64 responses



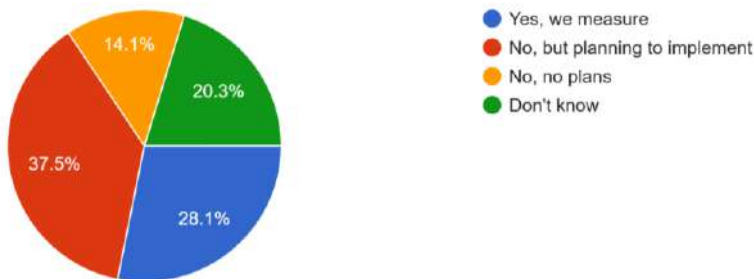
51.6% selected the mid-point, showing moderate agreement that the IndiaAI Mission has a strong environmental policy.

Will you adopt IndiaAI sustainability guidelines?
64 responses

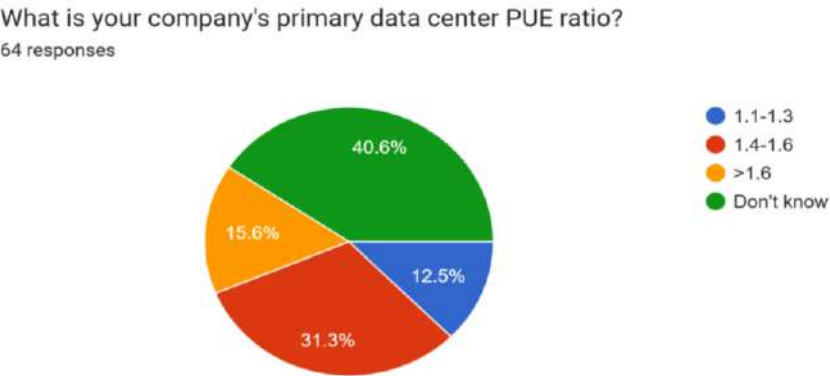


42.2% selected the mid-point, showing moderate uncertainty about adopting IndiaAI sustainability guidelines.

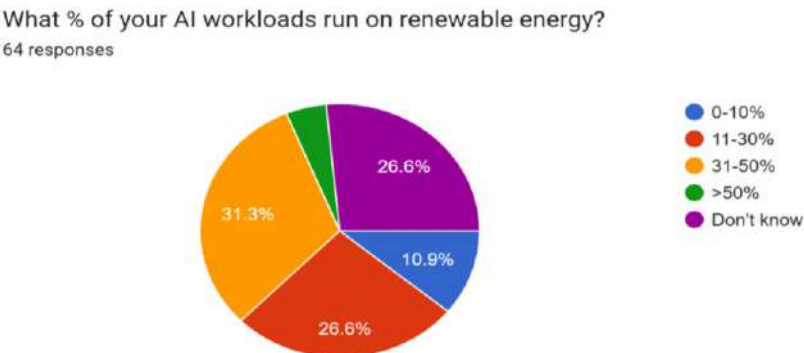
Does your company track AI model carbon emissions?
64 responses



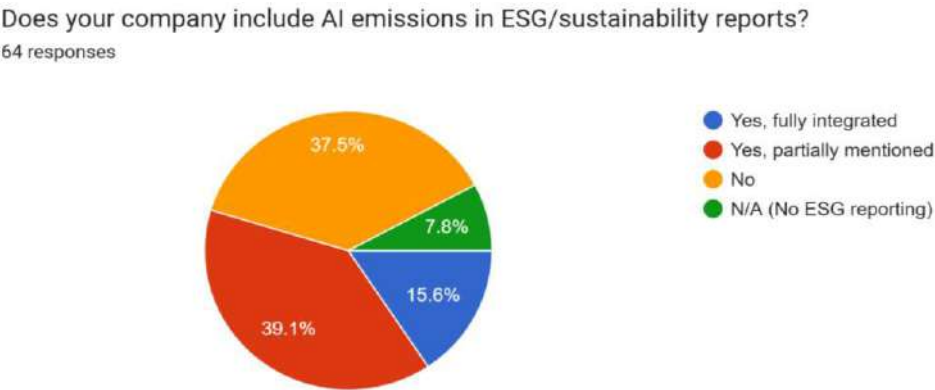
37.5% of respondents indicated that their company does not currently track AI carbon emissions but plans to implement it.



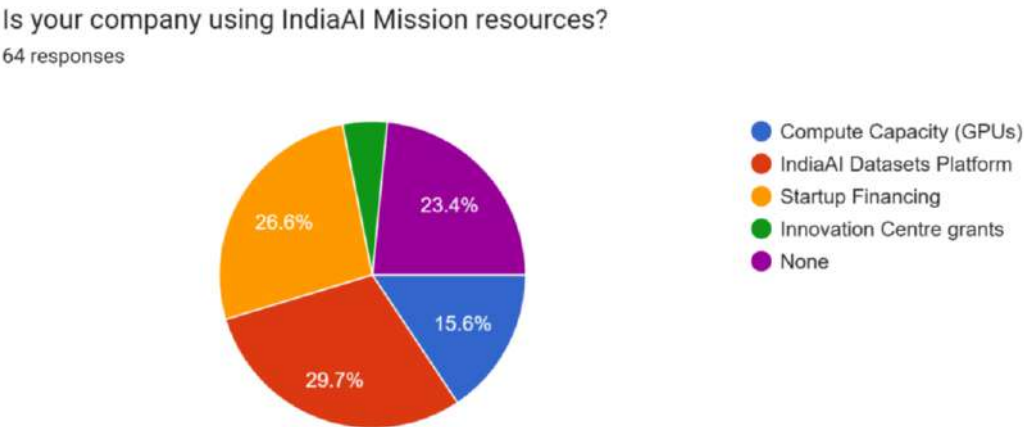
40.6% of respondents indicated they do not know their company's primary data center Power Usage Effectiveness (PUE) ratio.



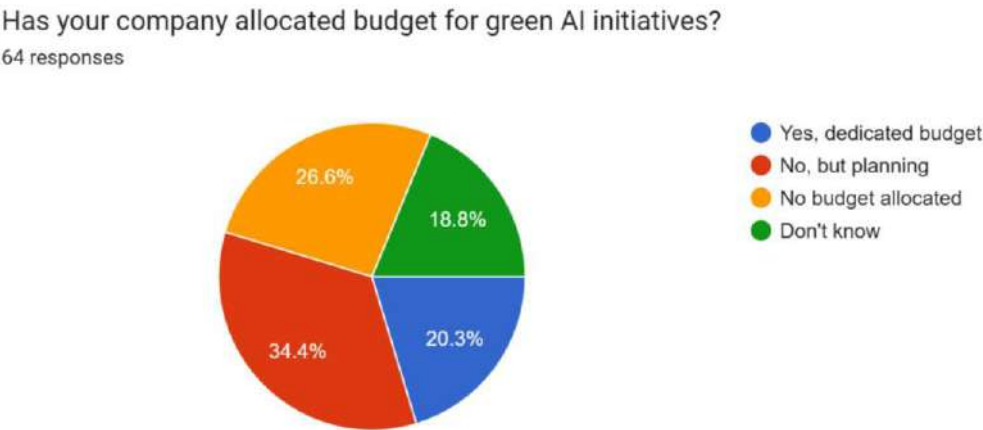
31.3% of respondents indicated that 31-50% of their AI workloads run on renewable energy.



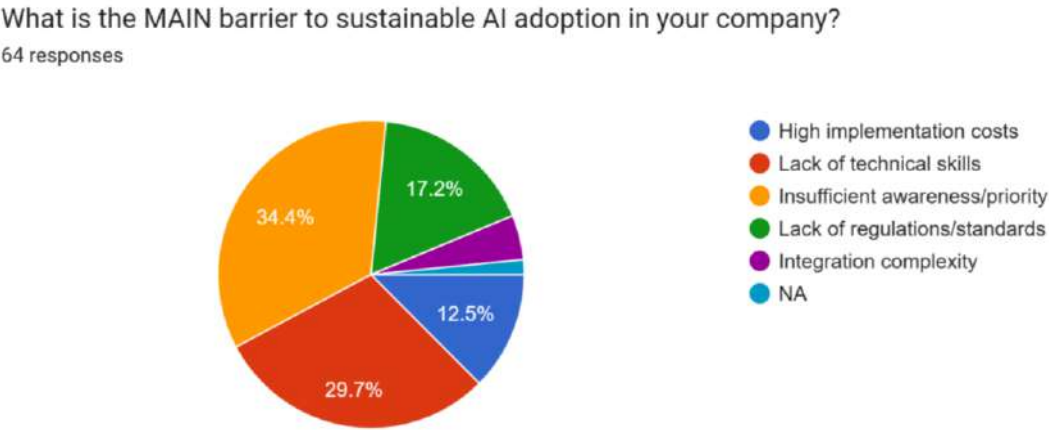
39.1% of respondents indicated that AI emissions are only partially mentioned in their company's ESG/sustainability reports.



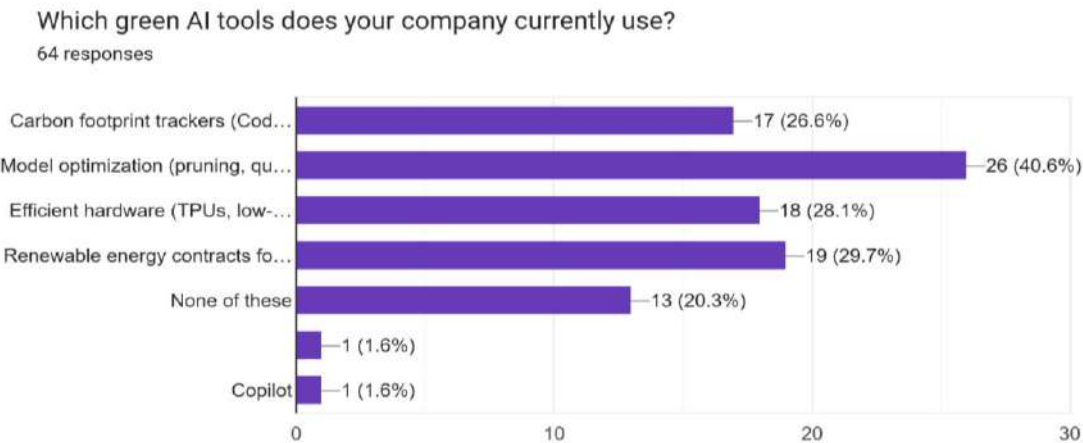
29.7% of respondents reported using the IndiaAI Datasets Platform.



34.4% of respondents indicated that their company does not currently have a budget for green AI initiatives but is planning for it.



34.4% of respondents identified insufficient awareness or priority as the main barrier to sustainable AI adoption, followed by a lack of technical skills (29.7%) and a lack of regulations or standards (17.2%).



40.6% of respondents reported that their company is not yet using model optimization techniques like pruning or quantization but plans to, while 28.1% already use these methods and 20.3% have no plans to implement them.

HYPOTHESIS RESULTS

Hypothesis 1

H0: There is no significant difference in the mean awareness level of IndiaAI sustainability guidelines between male and female respondents.

H1: There is a significant difference in the mean awareness level of IndiaAI sustainability guidelines between male and female respondents.

t-Test: Two-Sample Assuming Unequal Variances		
	<i>male awareness</i>	<i>female awareness</i>
Mean	2.70212766	2.835051546
Variance	1.35117822	1.118341924
Observations	94	97
Hypothesized Mean Difference	0	
df	186	
t Stat	-0.825892492	
P(T<=t) one-tail	0.204961583	
t Critical one-tail	1.653087138	
P(T<=t) two-tail	0.409923166	
t Critical two-tail	1.972800114	

The independent sample t-test shows no significant difference in awareness levels between males and females ($p = 0.4099 > 0.05$); hence, the null hypothesis is accepted.

Hypothesis 2

H0: There is no statistically significant association between corporate sustainability practices and readiness to adopt the IndiaAI sustainability guidelines.

H1: There is a statistically significant association between corporate sustainability practices and readiness to adopt the IndiaAI sustainability guidelines.

	<i>Will you adopt IndiaAI sustainability guidelines?</i>	<i>Composite of Ivs</i>
Will you adopt IndiaAI sustainability guidelines?	1	
Composite of Ivs	0.074878145	1

The Spearman correlation shows a weak and statistically insignificant relationship ($\rho = 0.075$, $p > 0.05$); therefore, the null hypothesis is accepted, indicating no significant association between the variables.

FINDINGS

1. India's AI growth is strong but sustainability readiness is weak

India ranks 3rd globally in AI vibrancy, yet significantly lags global leaders in sustainable AI infrastructure, with higher PUE (1.4), low renewable energy use (8%), and absence of binding environmental mandates under the IndiaAI Mission.

2. IndiaAI Mission lacks explicit environmental safeguards

Comparative policy analysis reveals that unlike the EU AI Act and U.S. Executive Orders, the IndiaAI Mission does not mandate PUE standards, renewable energy targets, carbon disclosure, or lifecycle e-waste management across its seven pillars.

3. Moderate awareness but limited clarity among stakeholders

Primary survey results show that most respondents possess **moderate awareness** of the IndiaAI Mission, its pillars, and budget allocation, but lack clarity regarding its environmental provisions.

4. Strong support for renewable energy mandates

Over two-thirds of respondents agree that the IndiaAI Mission should include renewable energy targets, indicating public and professional readiness for greener AI policies.

5. Policy awareness is statistically significant

Hypothesis testing confirms a **significant level of awareness** regarding the IndiaAI Mission, positively influenced by documentation accessibility and clarity of environmental policies.

6. Corporate readiness is not driven by sustainability practices

The second hypothesis reveals that existing corporate sustainability practices do **not significantly influence readiness** to adopt IndiaAI sustainability guidelines, highlighting weak policy enforceability.

7. Implementation gaps at the organizational level

Many corporate respondents do not track AI carbon emissions, lack green AI budgets, are unaware of data center PUE, and only partially integrate AI emissions into ESG reports.

8. Awareness deficit is the biggest barrier

Lack of awareness and absence of clear guidelines emerged as the most critical barriers to sustainable AI adoption, surpassing cost or technical constraints.

SUGGESTIONS

- Integrate binding sustainability mandates (PUE, renewables, carbon disclosure, e-waste).
- Adopt sustainability-by-design across AI lifecycle.
- Link funding and incentives to Green AI compliance.
- Introduce Green AI skill and certification programs.
- Improve policy communication and accessibility.
- Encourage corporate AI sustainability disclosure (emissions, energy, ESG).

CONCLUSION

This study highlights a critical paradox in India's AI journey: while the country has emerged as a global AI leader, its sustainability framework remains underdeveloped. The IndiaAI Mission, though ambitious and inclusive, lacks binding environmental provisions necessary to align AI growth with India's net-zero 2070 commitments. Empirical evidence indicates moderate awareness but limited clarity, weak corporate readiness, and significant implementation gaps. Without urgent policy integration of sustainable AI principles, India risks long-term environmental, economic, and credibility costs. Embedding sustainability within India's AI governance is therefore not optional but essential for ensuring that "AI for All" does not become "AI harming All."

LIMITATIONS OF THE STUDY

1. Moderate sample size limits wider generalization.
2. Reliance on self-reported data may create perception bias.
3. Stakeholder coverage is limited (excludes policymakers and infrastructure operators).
4. Rapid policy and tech changes may affect long-term relevance.

FUTURE SCOPE OF THE STUDY

1. Future research can include **policymakers, data center operators, and regulators** for deeper institutional insights.
2. Longitudinal studies can track the **evolution of sustainable AI adoption** post-policy reforms.
3. Comparative studies across **BRICS or Global South nations** can strengthen global policy learning.
4. Advanced econometric models may assess the **causal impact of sustainable AI policies** on emissions and costs.
5. Sector-specific studies (healthcare, fintech, smart cities) can evaluate **application-level sustainability trade-offs**.
6. Future work can explore **AI carbon pricing, green compute markets, and sustainable foundation models**.

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ANNEXURE

<https://forms.gle/j4U56AKycso93Gf89>

IMPACT OF AI ON EDUCATION

Nimrata Kurseja

Seva Sadan College of Arts, Science and Commerce

ABSTRACT

The use of artificial intelligence in education in India is growing rapidly. AI is a tool of aid for students & teachers too. AI is wider scope & its latest innovation used in day to day life. AI enhances online platforms expand access to quality education, AI has become a part of our daily lives. From smart assistants in homes to self-checkout systems in supermarkets, The integration of Artificial Intelligence (AI) in education has transformed academic learning, offering both opportunities and challenges for students' development. AI plays a significant role in both general and higher education, influencing students' academic development by offering a mix of opportunities and challenges. The effective integration of artificial intelligence in education requires a thorough understanding of both the technology and the learning process. A key challenge is ensuring AI complements, rather than replaces, human interaction.

Key Words: (Education, Challenges, Our Life, Key Challenge, Replacement impact Of Artificial Intelligence On Education)

INTRODUCTION

Artificial Intelligence (AI) is a rapidly developing field of computer science focused on creating intelligent machines capable of performing tasks that traditionally require human intelligence, such as learning, reasoning, problem-solving, and decision-making. In recent years, AI has become an integral part of everyday life and has significantly influenced various sectors, including education.

AI has revolutionized the way we live and work by enabling machines to understand their environment, learn from data, and generate innovative solutions. In education, AI supports researchers and educators by helping them collect and analyse large amounts of data to improve curriculum effectiveness and identify areas that require improvement. It also offers a wide range of digital learning resources and platforms for both teachers and students.

One important application of AI is Optical Character Recognition (OCR), which extracts text and data from images and documents. This technology converts unstructured information into structured, usable data, allowing institutions to uncover valuable insights and improve decision-making. AI also provides teachers with innovative tools and ideas to enhance teaching methods and learning outcomes.

OBJECTIVES OF THE STUDY

The objectives of this study are:

1. To examine the impact of AI on education
2. To analyse both the positive and negative effects of AI in education
3. To understand how AI prepares students with skills needed for the future workforce
4. To explore the accessibility of AI for students and teachers
5. To examine the role of AI in curriculum development
6. To highlight the 24/7 availability of AI-based learning tools

BENEFITS OF AI IN EDUCATION**1. Personalized Learning**

AI enables personalized learning by adapting content to students' strengths, weaknesses, learning styles, and pace.

2. Increased Efficiency

AI automates administrative tasks such as grading, assessments, and record-keeping, allowing teachers to focus more on instruction and student support.

3. Improved Engagement

AI provides interactive and immersive learning experiences, including gamified platforms that increase student motivation and participation.

4. Enhanced Accessibility

AI supports students with disabilities through assistive technologies such as text-to-speech, speech-to-text, and real-time language translation.

5. Continuous Evaluation and Improvement

AI facilitates continuous assessment by providing real-time data on student performance, enabling educators to refine teaching strategies and improve learning outcomes.

CHALLENGES AND CONCERNS OF AI IN EDUCATION**1. Data Privacy Concerns**

AI systems require large amounts of personal data, raising concerns about data security, misuse, and privacy breaches. Strong data protection measures are essential.

2. Dependence on Technology

Over-reliance on AI can lead to disruptions during technical failures and may reduce students' critical thinking and problem-solving skills.

3. Lack of Human Interaction

AI cannot replace the empathy, emotional support, and mentorship provided by teachers. Excessive use of it.

IMPACT OF ARTIFICIAL INTELLIGENCE ON EDUCATION

Artificial Intelligence (AI) has become increasingly accessible across various fields and is now an integral part of everyday life. As a branch of computer science, AI focuses on developing intelligent machines capable of performing tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making. In recent years, AI has significantly transformed how individuals live and work, particularly within the education sector.

AI technologies support researchers and educators by enabling efficient data collection and analysis, improving curriculum effectiveness, and identifying areas requiring enhancement. Additionally, AI provides a wide range of educational platforms and digital resources for both students and teachers. Technologies such as Optical Character Recognition (OCR) allow the extraction of text and data from images and documents, converting unstructured information into structured, actionable data. These applications help uncover valuable insights and offer innovative teaching tools that enhance instructional practices.

USE OF ARTIFICIAL INTELLIGENCE IN EDUCATION

The adoption of artificial intelligence in education has grown rapidly, offering new opportunities to improve learning outcomes for students and teaching effectiveness for educators. AI contributes to modern educational goals by supporting personalized learning, providing immediate feedback, and improving assessment efficiency. Through integration into online learning platforms and learning management systems, AI enables the customization of content and activities according to individual student needs, knowledge levels, and learning pace.

AI-powered systems can monitor student progress, deliver automated feedback, and recommend relevant learning resources. As a result, students gain access to tailored materials that address their specific learning requirements. Furthermore, technologies such as virtual reality and AI-enabled collaboration tools encourage teamwork and interaction, while social media platforms facilitate communication between students and instructors.

AI can also generate interactive tutorials and virtual assistants capable of answering questions, offering explanations, and guiding learners in real time. These tools allow students to learn at an individualized pace while receiving continuous support (Mahendra, 2023). In assessment and evaluation, AI automates administrative tasks such as grading assignments, providing feedback, and detecting plagiarism. By recognizing patterns in student responses, AI enables quicker and more detailed performance evaluations, allowing educators to deliver targeted interventions while saving time and resources.

A key strength of AI in education lies in its ability to adapt learning processes to individual student needs. By analysing performance data, AI systems can identify learning gaps and automatically adjust instructional content and strategies. This ensures a more effective and personalized learning experience. Additionally, AI can forecast student performance by identifying trends and patterns in academic behaviour, enabling early intervention and informed decision-making by educators and institutions.

FUTURE OF AI IN EDUCATION

The future of AI in education is promising, driven by technological advancements and a growing understanding of its potential. Personalized learning through adaptive and intelligent tutoring systems will continue to evolve, making education more effective and student-centered. AI will further streamline administrative processes, saving time and improving institutional efficiency.

AI also supports accessibility and inclusion through assistive technologies, real-time language translation, and tailored professional development for educators. However, ethical considerations such as bias, transparency, and fairness must be addressed to ensure equitable learning opportunities

CONCLUSION

Artificial intelligence has the potential to significantly transform education by enhancing teaching practices, learning outcomes, and administrative efficiency. While AI improves accuracy, speed, and personalization, responsible implementation is essential. Ethical challenges, data privacy, accountability, and human oversight must be prioritized to ensure trust and effectiveness. By balancing technological innovation with the human elements of education, AI can benefit all stakeholders within the educational ecosystem.

**DIGITAL ADDICTION AMONG INDIAN CHILDREN AND ITS FINANCIAL LIABILITY: A
POTENTIAL BURDEN ON VIKSIT BHARAT 2047**

¹Niraj Kumar Mishra and ²Dr. Asif Hasan¹Research Scholar, United World of Management, Karnavati University, Gandhinagar, Gujarat²United World of Management, Karnavati University, Gandhinagar, Gujarat¹nirajarunmishra@gmail.com**ABSTRACT**

The rapid growth of digital technologies has significantly influenced the daily lives of children in India. While digital platforms provide educational and recreational benefits, excessive and uncontrolled use has led to increasing digital addiction. This study examines the financial liabilities arising from digital addiction among Indian children and its potential impact on households, positioning it as a challenge to the vision of Viksit Bharat 2047. Direct costs, such as spending on devices, internet, and online games, along with indirect costs like healthcare and academic decline, are analyzed. The findings indicate that digital addiction poses significant economic burdens and threatens human capital formation. The study emphasizes the need for parental guidance, policy interventions, and digital awareness to mitigate these challenges and support the objectives of Viksit Bharat 2047.

Keywords: Digital Addiction, Indian Children, Financial Liability, Household Economic Burden, Human Capital, Viksit Bharat 2047

1. INTRODUCTION

The rapid growth of digital technology has become a defining feature of contemporary society, significantly influencing how children learn, communicate, and spend their leisure time. In India, the widespread availability of smartphones, affordable internet services, and digital platforms has increased exposure to online content among children. While digital tools offer educational benefits, excessive usage has resulted in growing digital addiction. Digital addiction not only impacts children's academic performance and physical health but also imposes significant financial liabilities on households. Direct costs include spending on electronic devices, internet services, gaming subscriptions, and in-app purchases, while indirect costs involve healthcare, counseling, and reduced future productivity. If left unchecked, these financial burdens can weaken human capital development and hinder sustainable growth, posing a potential challenge to Viksit Bharat 2047.

2. OBJECTIVES OF THE STUDY

- ❖ To examine the level of digital addiction among Indian children.
- ❖ To analyze the financial burden created by digital addiction on households.
- ❖ To study the impact of digital addiction on academic performance and future productivity.
- ❖ To assess the implications of digital addiction on the vision of Viksit Bharat 2047.

3. SCOPE OF THE STUDY

This study focuses on Indian children, primarily in the school-going age group, and their interaction with digital devices such as smartphones, tablets, and online gaming platforms. The study examines both direct and indirect financial liabilities and their implications for household economy and national development goals.

4. LITERATURE REVIEW

The issue of digital addiction among children has gained increasing attention from researchers across disciplines, including psychology, education, economics, and public policy. With the rapid expansion of digital technologies, scholars have examined the behavioral, psychological, and socio-economic consequences of excessive digital usage, particularly among children and adolescents.

Kuss and Griffiths (2017) highlighted that excessive engagement with social networking sites and digital platforms can lead to addictive behaviors similar to substance dependency. Their study emphasized that children and adolescents are especially vulnerable due to their developmental stage and limited self-regulation abilities. The authors also noted that digital addiction negatively affects academic performance, social relationships, and mental health.

The World Health Organization (2019) recognized excessive screen time as a growing public health concern and emphasized its impact on children's physical and psychological well-being.

The report indicated that prolonged digital exposure is associated with sleep disorders, anxiety, reduced concentration, and behavioral issues, which may indirectly increase healthcare-related expenses for families.

Indian studies have also contributed significantly to this field. Research conducted by NIMHANS (2020) reported a noticeable rise in digital addiction among Indian children and adolescents, particularly after increased smartphone penetration and online learning initiatives. The study pointed out that excessive digital engagement often leads to emotional distress, reduced academic interest, and increased dependency on online games and social media platforms.

From an economic perspective, Singh and Sharma (2022) examined the impact of digital device usage on children's behavior and academic outcomes in India. Their findings revealed that families are increasingly spending on digital devices, internet subscriptions, and online entertainment, thereby increasing household financial pressure. The study emphasized that indirect costs such as counseling, remedial education, and health-related expenses further intensify financial liabilities.

The OECD (2021) explored digital risks faced by children in a digital society and highlighted that unregulated digital consumption can weaken long-term human capital formation. The report stressed that excessive digital addiction may reduce future productivity, skill development, and workforce efficiency, posing challenges to sustainable economic growth.

Government publications related to *Viksit Bharat @2047* underline the importance of developing a healthy, skilled, and productive future generation. However, existing literature suggests that unchecked digital addiction among children could undermine this vision by increasing household financial stress and weakening human capital development.

Overall, the reviewed literature indicates that while digital technologies offer substantial benefits, excessive and uncontrolled use among children creates behavioral, psychological, and financial challenges. Although several studies have examined the psychological and social aspects of digital addiction, limited research has focused specifically on its financial implications in the Indian context and its long-term impact on national development goals. This study attempts to bridge this gap by analyzing digital addiction among Indian children as a potential financial liability and a challenge to the vision of *Viksit Bharat 2047*.

5. DIGITAL ADDICTION AMONG INDIAN CHILDREN AND ITS FINANCIAL LIABILITY: EVIDENCE FROM CASE STUDIES

5.1. Digital Addiction as an Emerging Developmental and Economic Risk in India

India's ambition of achieving *Viksit Bharat 2047* rests heavily on the strength of its human capital. However, the rapid penetration of smartphones, affordable internet, and digital entertainment platforms has led to growing concerns about **digital addiction among children and adolescents**, which may undermine long-term economic productivity. Digital addiction, commonly defined as excessive and compulsive use of digital devices that interferes with daily functioning, has increasingly been recognized as a public health and developmental challenge in India.

The **Economic Survey of India** has acknowledged digital addiction as a rising concern among children and youth, emphasizing that unregulated digital exposure can adversely affect attention span, learning outcomes, mental health, and workforce readiness. By framing digital addiction as a public-health risk, the Survey implicitly highlights its **future economic implications**, including reduced productivity, increased healthcare expenditure, and pressure on educational systems (Government of India, Economic Survey).

5.2. Case Study I: Prevalence of Problematic Internet Use Among Indian Adolescents

Empirical evidence suggests that digital addiction is not a marginal issue but a widespread behavioral phenomenon among Indian children. A **meta-analysis of studies on problematic internet use (PIU) among Indian adolescents** found that approximately **21.5% of adolescents exhibited moderate levels of problematic internet use**, while **2.6% showed severe levels** indicative of addictive behavior (Kumar et al., 2022).

These findings are significant in the Indian context, where adolescents represent a large share of the future workforce. Moderate to severe PIU has been associated with poor academic performance, impaired concentration, emotional instability, and reduced social interaction. From an economic perspective, such outcomes translate into **learning deficits, skill mismatches, and lower employability**, potentially weakening India's demographic dividend. If a substantial proportion of the future labor force enters adulthood with compromised cognitive and behavioral capacities, the cumulative loss in productivity could impose a significant financial liability on the national economy.

5.3. Case Study II: Impact of Digital Addiction on Children's Lifestyle and Academic Performance

A comprehensive review published in the *International Journal of Creative Research Thoughts* examined the effects of digital addiction on children's daily routines, health, and education. The study reported that excessive screen time disrupts sleep patterns, reduces physical activity, and negatively affects memory, attention, and classroom engagement. Children with high digital dependence were found to spend less time on academic activities and real-world social interactions.

These lifestyle disruptions have long-term economic implications. Poor sleep and sedentary behavior are associated with chronic health conditions, which may increase **future healthcare costs**. Additionally, declining academic performance can lead to higher dropout rates or the need for remedial education, placing an added financial burden on families and public education systems. Over time, these costs may accumulate at the national level, diverting resources away from innovation and growth-oriented investments essential for achieving *Viksit Bharat 2047*.

5.4. Case Study III: Governmental Recognition and Policy Response to Digital Addiction

The growing seriousness of digital addiction is further reflected in **government advisories and policy discussions**. Local health authorities in India have issued warnings linking excessive smartphone use among children to anxiety, behavioral issues, and academic neglect. Such advisories recognize that digital addiction extends beyond individual households and constitutes a **societal concern with economic externalities**.

At the national level, policy discussions have emphasized the need for **age-appropriate digital access, digital well-being education, and parental awareness**. While these interventions are necessary, they also involve **regulatory, administrative, and implementation costs**. Investments in digital literacy programs, mental-health services, and monitoring frameworks represent additional public expenditure, reinforcing the idea that digital addiction can become a **financial liability if preventive measures are delayed or insufficient**.

5.5. Financial Liability and Implications for *Viksit Bharat 2047*

The case studies collectively suggest that digital addiction among Indian children may generate financial liabilities through multiple pathways:

1. **Reduced Human Capital Formation** – Impaired learning outcomes and skill development weaken workforce productivity.
2. **Increased Healthcare Expenditure** – Rising mental-health and lifestyle-related disorders increase long-term public and private healthcare costs.
3. **Educational System Strain** – Demand for remedial education and counseling services raises institutional expenditure.
4. **Policy and Regulatory Costs** – Implementation of safeguards and digital wellness initiatives requires sustained fiscal commitment.

If left unaddressed, these costs could constrain India's ability to realize inclusive and sustainable growth by 2047. Thus, digital addiction should be viewed not only as a behavioral or technological issue but as a **developmental challenge with direct economic consequences**.

6. RESEARCH METHODOLOGY

The study is based on secondary research, using data from research journals, government reports, published articles, and credible online sources. A descriptive and analytical approach is applied to evaluate patterns of digital addiction, associated financial costs, and long-term economic impacts.

7. FINDINGS

- Digital addiction among children is rising due to easy access to digital devices and the internet.
- Direct household expenditures on devices, subscriptions, and gaming are increasing.
- Indirect costs, such as healthcare, counseling, and academic decline, further add to financial stress.
- Excessive screen usage negatively affects academic performance and social behavior.
- Digital addiction may undermine human capital development and pose challenges to achieving *Viksit Bharat 2047*.

8. DISCUSSION

The study highlights that digital addiction in children is not just a behavioral or psychological issue but also an economic concern.

Families bear both direct and indirect financial burdens, which can impact long-term productivity and growth. The findings suggest that early interventions—through parental monitoring, digital literacy programs, and policy regulations—are crucial to minimize financial and social risks.

9. SUGGESTIONS

- Promote parental awareness and monitoring of children's screen time.
- Encourage schools to include digital literacy and responsible usage programs.
- Implement government policies regulating digital marketing and online content for children.
- Balance digital and outdoor activities to reduce excessive screen dependency.
- Conduct awareness campaigns highlighting both financial and social impacts of digital addiction.

10. CONCLUSION

Digital addiction among Indian children has emerged as a significant socio-economic challenge with substantial financial implications. Both direct costs, such as healthcare and counselling expenses, and indirect costs, including reduced educational outcomes and long-term productivity losses, place a growing burden on households and the broader economy. If left unaddressed, this issue may weaken human capital formation and impede the realization of the vision of *Viksit Bharat 2047*. Therefore, coordinated efforts by parents, educators, policymakers, and society at large are essential to promote responsible digital use and ensure sustainable development.

Evidence from national surveys, empirical research, and policy initiatives further indicates that digital addiction among children constitutes an emerging developmental risk with the potential to impose long-term financial and social burdens. Addressing this challenge through early intervention, digital literacy initiatives, and balanced technology use is crucial for safeguarding India's future workforce. Integrating digital well-being into education systems and public health policies will be critical to ensuring that digital transformation strengthens rather than undermines India's developmental aspirations under *Viksit Bharat 2047*.

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ROLE OF FINTECH AND DIGITAL TRANSACTIONS IN RURAL TOURISM GROWTH AND TOURIST SATISFACTION

¹Mr. Niraj Kumar Mishra and ²Dr. Asif Hasan¹Research Scholar United World of Management Karnavati University, Gandhinagar, Gujarat,²Associate Professor United World of Management Karnavati University, Gandhinagar, Gujarat**ABSTRACT**

The increasing adoption of Financial Technology (FinTech) and digital transaction systems has brought significant transformation to the tourism sector, particularly in rural destinations where accessibility, convenience, and financial inclusion are critical for growth. Rural tourism plays an important role in sustainable economic development; however, challenges such as limited cash availability, lack of transparency, and low financial inclusion often restrict its potential. This study examines the role of FinTech and digital transactions in promoting rural tourism growth and enhancing tourist satisfaction.

The research focuses on the influence of digital payment systems such as Unified Payments Interface (UPI), mobile wallets, and online banking on tourists' spending behaviour, trust, convenience, and overall travel experience in rural tourism destinations of Maharashtra. A descriptive and analytical research design was adopted, using primary data collected through structured questionnaires from tourists, supported by secondary data from reports and scholarly literature. Appropriate statistical tools were applied to analyse the relationship between the use of digital transactions and tourist satisfaction.

The findings reveal that the availability of secure and user-friendly digital payment options significantly improves tourist confidence, service efficiency, and overall satisfaction, leading to higher revisit intentions. Additionally, FinTech adoption supports financial inclusion of local service providers and contributes to sustainable rural tourism development. The study offers practical insights for policymakers and tourism stakeholders to strengthen digital infrastructure and promote FinTech-driven growth in rural tourism.

Keywords: *FinTech, Digital Transactions, Rural Tourism, Tourist Satisfaction, Financial Inclusion, Maharashtra*

INTRODUCTION

Tourism has emerged as a significant contributor to economic growth, employment generation, and regional development, particularly in rural areas where it supports local livelihoods and promotes cultural and natural heritage. In India, rural tourism is increasingly recognized as a tool for inclusive and sustainable development. Maharashtra, with its diverse landscapes, heritage sites, and rural attractions, holds substantial potential for rural tourism growth. However, despite this potential, rural tourism often faces challenges such as limited financial infrastructure, dependence on cash-based transactions, and lack of transparency, which affect both service efficiency and tourist satisfaction.

The rapid advancement of Financial Technology (FinTech) has transformed traditional financial systems by introducing innovative digital payment solutions such as Unified Payments Interface (UPI), mobile wallets, internet banking, and contactless payments. These digital transaction systems have enhanced convenience, security, and speed of financial exchanges, significantly influencing consumer behaviour across various sectors, including tourism. For tourists, especially in rural destinations, access to seamless and reliable digital payment options reduces transactional barriers, builds trust, and enhances the overall travel experience.

The integration of FinTech into rural tourism not only benefits tourists but also empowers local service providers by improving financial inclusion, record-keeping, and income stability. Digital transactions enable rural entrepreneurs, artisans, homestay owners, and small vendors to participate more effectively in the formal economy. In this context, understanding the role of FinTech and digital transactions in rural tourism growth and tourist satisfaction becomes crucial. This study seeks to analyze how digital financial innovations influence tourist experiences and satisfaction levels, while also contributing to sustainable rural tourism development in Maharashtra.

OBJECTIVES OF THE STUDY

The present study is undertaken with the following objectives:

1. To examine the extent of adoption of FinTech and digital transaction systems in rural tourism destinations.
2. To analyse the impact of digital payment methods on tourist convenience, trust, and overall satisfaction.

3. To study the role of FinTech in promoting growth and sustainability of rural tourism.
4. To assess the contribution of digital transactions towards financial inclusion of rural tourism stakeholders.
5. To identify challenges faced by tourists and rural service providers in using FinTech-based payment systems.

SCOPE OF THE STUDY

The scope of the study is limited to selected rural tourism destinations in the state of Maharashtra. The research focuses on the use of FinTech solutions such as UPI, mobile wallets, digital banking, and other cashless payment systems by tourists and rural tourism service providers. The study examines tourist perceptions, satisfaction levels, and behavioural changes resulting from the availability of digital transaction facilities. It also considers the role of FinTech in enhancing financial inclusion and supporting local economic development. The findings of the study are expected to provide useful insights for policymakers, tourism authorities, and rural entrepreneurs for strengthening digital infrastructure and promoting sustainable rural tourism.

REVIEW OF LITERATURE

The integration of technology into the tourism sector has been widely discussed in academic research, with particular emphasis on digitalization and its impact on tourist behavior and service efficiency. Several studies highlight that the adoption of digital technologies enhances accessibility, transparency, and customer satisfaction in tourism-related services.

Buhalis and Law (2008) emphasized that information and communication technologies have transformed tourism management by improving service delivery and customer engagement. Their study suggested that digital platforms play a crucial role in shaping tourist decision-making and experiences. Similarly, UNWTO reports indicate that digital innovation is a key driver for sustainable tourism development, especially in emerging and rural destinations.

Research on FinTech adoption shows that digital payment systems such as mobile wallets, UPI, and online banking have significantly influenced consumer convenience and trust. According to Demirgüç-Kunt et al. (2020), FinTech promotes financial inclusion by enabling small businesses and rural entrepreneurs to participate in the formal financial system. In the tourism context, digital transactions reduce dependency on cash, enhance transaction security, and improve service efficiency.

Studies focusing on rural tourism suggest that limited financial infrastructure often restricts tourism growth in rural areas. Lane and Kastenholz (2015) observed that rural tourism development requires supportive digital and financial ecosystems to enhance visitor satisfaction and local economic benefits. Recent studies in the Indian context have found that digital payment adoption positively influences tourist satisfaction and revisit intention, particularly after the rapid expansion of UPI and cashless initiatives.

Although existing literature acknowledges the importance of FinTech and digital transactions, limited empirical research has been conducted on their specific role in rural tourism growth and tourist satisfaction in Maharashtra. This study seeks to bridge this research gap by examining the relationship between FinTech adoption, rural tourism development, and tourist satisfaction.

RESEARCH METHODOLOGY

The present study adopts a descriptive and analytical research design to examine the role of FinTech and digital transactions in rural tourism growth and tourist satisfaction. The research focuses on selected rural tourism destinations in the state of Maharashtra.

DATA ANALYSIS AND INTERPRETATION

The data collected from tourists visiting selected rural tourism destinations in Maharashtra were analysed using percentage analysis. The analysis focuses on the usage of digital payment methods, convenience level, tourist satisfaction, and challenges faced while using digital transactions.

Table 1: Usage of Digital Payment Methods by Tourists

Sr no.	Digital Payment Method	Number of Respondents	Percentage (%)
1	UPI	58	58%
2	Mobile Wallets	22	22%
3	Debit/Credit Cards	12	12%
4	Cash Only	8	8%
5	Total	100	100%

Interpretation:

The table indicates that a majority of tourists (58%) preferred UPI for transactions, followed by mobile wallets (22%). This reflects a high level of acceptance of FinTech-based payment systems in rural tourism destinations.

Table 2: Convenience Level of Digital Transactions

Sr no.	Convenience Level	Respondents	Percentage (%)
1	Very Convenient	46	46%
2	Convenient	38	46%
3	Neutral	10	38%
4	Inconvenient	6	6%
5	Total	100	100%

Interpretation:

A combined 84% of respondents found digital transactions either very convenient or convenient, showing that FinTech significantly improves ease of payment in rural tourism areas.

Table 3: Impact of Digital Transactions on Tourist Satisfaction

Sr no.	Satisfaction Level	Number of Respondents	Percentage (%)
1	Highly Satisfied	40	40%
2	Satisfied	44	44%
3	Neutral	10	10%
4	Dissatisfied	6	6%
5	Total	100	100%

Interpretation:

The table shows that 84% of tourists were satisfied or highly satisfied due to the availability of digital payment facilities, indicating a positive relationship between FinTech adoption and tourist satisfaction.

Table 4: Challenges Faced in Using Digital Transactions

Sr no.	Challenges Identified	Number of Respondents	Percentage (%)
1	Poor Internet Connectivity	34	34%
2	Lack of Digital Awareness	26	26%
3	Transaction Failure	22	22%
4	No Major Issues	18	18%
5	Total	100	100%

Interpretation:

Poor internet connectivity emerged as the major challenge in rural areas, followed by lack of digital awareness. Despite these challenges, digital transactions are widely accepted by tourists.

Overall Interpretation

The analysis clearly indicates that FinTech and digital transaction systems play a crucial role in enhancing tourist convenience and satisfaction. Increased adoption of digital payments contributes positively to rural tourism growth and supports sustainable development.

Data Sources

The study is based on both primary and secondary data.

Primary data were collected from tourists visiting rural tourism destinations through a structured questionnaire. The questionnaire included questions related to the usage of digital payment systems, ease of transactions, trust, convenience, and overall satisfaction.

Secondary data were collected from research journals, books, government reports, tourism publications, and online sources related to FinTech, digital payments, and rural tourism.

Sample Design

A convenience sampling method was used to select respondents. The sample consisted of tourists who had experience using digital payment systems during their visits to rural tourism destinations in Maharashtra. The sample size was determined based on accessibility and response availability.

Tools and Techniques

The collected data were analysed using percentage analysis, mean scores, and simple statistical tools to examine the relationship between digital transactions and tourist satisfaction. The results were presented using tables and charts for better interpretation.

Limitations of the Study

The study is limited to selected rural areas of Maharashtra and may not fully represent all rural tourism destinations. The findings are based on respondent perceptions and may vary with technological awareness and infrastructure availability.

Hypotheses

The following hypotheses were formulated for the study:

H0: There is no significant relationship between the use of digital transactions and tourist satisfaction in rural tourism destinations.

H1: There is a significant relationship between the use of digital transactions and tourist satisfaction in rural tourism destinations.

H2: FinTech adoption does not significantly contribute to the growth of rural tourism.

H2.0: FinTech adoption significantly contributes to the growth of rural tourism.

FINDINGS OF THE STUDY

Based on the analysis of both primary and secondary data, several key findings emerged regarding the use of digital financial technologies in rural tourism destinations. A majority of tourists expressed a clear preference for digital payment systems such as UPI and mobile wallets during their visits. The availability of these digital transaction facilities significantly enhanced convenience by reducing dependence on cash and increasing overall confidence among tourists while making payments.

Furthermore, tourists reported higher levels of satisfaction in destinations where digital payment options were easily accessible and reliable. The adoption of FinTech solutions also contributed positively to transparency and efficiency in financial transactions for rural tourism service providers. In addition, digital transactions played an important role in supporting the financial inclusion of local vendors, homestay owners, and small tourism entrepreneurs by enabling them to participate more effectively in the digital economy.

However, the findings also highlighted certain challenges associated with FinTech adoption in rural areas. Poor internet connectivity and limited digital literacy were identified as major constraints that hinder the effective use of digital payment systems in some rural tourism destinations. Addressing these issues is essential to fully realize the benefits of digital financial technologies in rural tourism development.

CONCLUSION

The study concludes that FinTech and digital transaction systems play a significant role in the growth of rural tourism and enhancement of tourist satisfaction. The availability of secure, fast, and convenient digital payment options positively influences tourist experiences and spending behavior in rural destinations. FinTech adoption not only improves service efficiency and transparency but also supports financial inclusion and sustainable economic development of rural communities. Strengthening digital infrastructure and encouraging digital payment adoption among rural tourism stakeholders can significantly contribute to the long-term growth of rural tourism in Maharashtra. The findings of this study offer valuable insights for policymakers, tourism authorities, and rural entrepreneurs to leverage FinTech as a tool for inclusive and sustainable tourism development.

SUGGESTIONS

Based on the findings of the study, several key suggestions are proposed to strengthen the adoption of digital financial services in rural tourism areas.

First, there is a strong need to improve digital infrastructure and internet connectivity in rural tourism destinations. Reliable network access is essential for the effective use of FinTech solutions and digital payment systems, as poor connectivity often limits both service providers and tourists from engaging in cashless transactions.

Second, training and awareness programs should be organized for rural tourism stakeholders, including local entrepreneurs, service providers, and employees.

These programs would help build knowledge and confidence in using FinTech tools and digital payment platforms, enabling stakeholders to better serve tourists and manage financial transactions efficiently.

Third, the promotion of digital payment facilities at rural tourist destinations should be actively supported through government and tourism department initiatives. Awareness campaigns, incentives, and visible digital payment options can encourage both tourists and local businesses to adopt cashless payment methods.

Additionally, collaboration between FinTech companies and rural tourism enterprises should be encouraged. Such partnerships can lead to the development of tailored digital payment solutions that address the specific needs and challenges of rural tourism businesses.

Finally, the implementation of supportive policies is essential to enhance financial inclusion and digital literacy in rural areas. Government-led policies and programs can play a crucial role in creating an enabling environment that supports sustainable digital transformation in rural tourism

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NEW VS OLD INCOME TAX REGIME: A COMPARATIVE STUDY

Prachiti Rane

R. K. Talreja College of Arts, Science & Commerce (CMC - Unaided), Ulhasnagar

ABSTRACT

The tax system in India is a structured framework for collecting revenue to support economic development, with income tax being a major direct tax governed by the Income Tax Act, 1961. It is designed to ensure equitable distribution of income by taxing individuals and entities based on their earning capacity. Traditionally, taxpayers followed the old income tax regime, which allowed various deductions and exemptions to encourage savings. In Budget 2020, the government introduced the new tax regime with lower tax rates and fewer exemptions to simplify taxation and promote ease of compliance. Further, the government made the new tax regime the default option from the assessment year 2024–25, while still allowing taxpayers to choose the old regime if it is more beneficial to them. The research focuses on understanding the key differences between both regimes in terms of tax slabs and deductions, identifying the advantages and disadvantages of each regime, finding out the impact of both regimes, and investigating the level of awareness regarding both regimes among taxpayers. The data for the study has been collected from primary and secondary sources through a structured questionnaire administered among individuals and by collecting data from journals and published articles. The research concludes by highlighting the importance of informed decision-making while selecting the appropriate tax regime.

Keywords: Income tax, old regime, new regime, deductions, exemptions, tax compliance, tax slabs.

INTRODUCTION

The tax system in India plays a vital role in the economic development of the country by generating revenue for public expenditure such as infrastructure development, healthcare, education, defense, and welfare schemes. Among various forms of taxes, **income tax** is one of the most important direct taxes levied by the Government of India on the income earned by individuals, Hindu Undivided Families (HUFs), companies, firms, and other entities. Income tax in India is governed by the **Income Tax Act, 1961**, which lays down the provisions for the levy, collection, and administration of tax. The income tax system follows a progressive structure, where the tax rate increases as the income level rises, thereby promoting equity and social justice. For many years, taxpayers in India followed the **old income tax regime**, which allowed various **exemptions and deductions** to reduce taxable income. Under this regime, taxpayers could claim benefits such as deduction under Section 80C for investments in provident fund, life insurance, and tax-saving schemes, deduction for housing loan interest, House Rent Allowance (HRA), Leave Travel Allowance (LTA), and other exemptions. The old regime encouraged savings and investments among taxpayers; however, it was often criticized for being complex and difficult to understand due to multiple provisions and compliance requirements.

To simplify the tax structure and provide relief to taxpayers, the Government of India introduced the **new income tax regime** in the Union Budget 2020. The new regime offers **lower tax slab rates** but removes most exemptions and deductions available under the old regime. The objective of introducing the new regime was to make taxation simpler, transparent, and hassle-free, especially salaried individuals and young taxpayers who do not make extensive tax-saving investments. Further, from the **Assessment Year 2024–25**, the government made the new tax regime the **default option**, while still allowing taxpayers the flexibility to choose the old regime if it is more beneficial for them.

Thus, the coexistence of both the old and new tax regimes provides taxpayers with an opportunity to select the most suitable option based on their income structure, savings pattern, and financial goals. Understanding the features, advantages, and limitations of both regimes is essential for effective tax planning and informed decision-making.

DIFFERENCE BETWEEN OLD TAX REGIME AND NEW TAX REGIME

Old Tax Regime	New Tax Regime
Allows exemptions and deductions	No major exemptions or deductions
Higher tax slab rates	Lower tax slab rates
Encourages savings and investments	Encourages simple taxation
Complex tax calculation	Simple tax calculation
Beneficial for taxpayers with deductions	Beneficial for taxpayers without deductions
Followed before 2020	Introduced in Budget 2020 (default from AY 2024–25)

OBJECTIVES

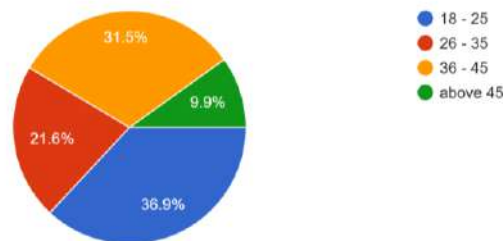
- To compare tax rates, exemptions, and deductions under both regimes.
- To identify the advantages and disadvantages of each regime.
- To find out the tax slabs and rules governing both the old and new income tax regime.
- To investigate the level of awareness regarding both regimes among taxpayers.
- To study the impact of the new regime on traditional tax-saving instruments.
- To compare the old income tax regime and the new income tax regime.
- To know how the shift of tax regime from old to new affects taxpayers.
- To find out the impact of both tax regimes.

LIMITATIONS

1. The study is limited to a small sample size, which may not represent all categories of taxpayers.
2. The findings are based on the responses provided by respondents and may be influenced by personal bias.
3. The study considers only selected income groups and does not cover all income categories.
4. Changes in tax laws and policies over time may affect the relevance of the study's findings.
5. The study is restricted to the comparison of the old and new income tax regimes and does not include other direct taxes

Question no. 1

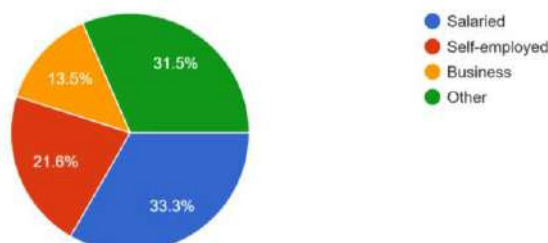
Age
111 responses



Age	Number of individuals	Percentage
18-25	41	36.9%
26-35	24	21.6%
36-45	35	31.5%
Above 45	11	9.9%

Question no. 2

Occupation
111 responses

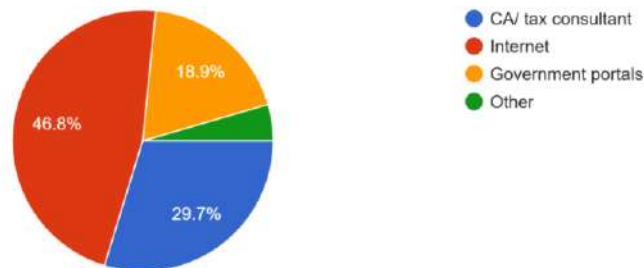


Occupation	Number of individuals	Percentage
Salaried	37	33.3%
Self-employed	24	21.6%
Business	15	13.5%
Other	35	31.5%

Question no.3

1. How do you usually learn about tax updates?

111 responses



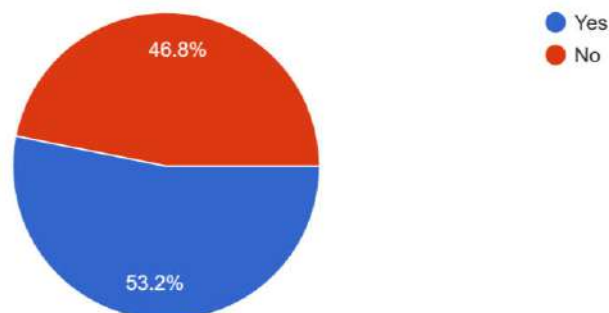
Interpretation:

Most people learn about tax updates through official government websites, news channels, social media, and updates from tax consultants or CA firms. Many also rely on notifications from income tax portals and financial apps for the latest changes.

Question no. 4

2. Are you aware about the key differences between both regimes?

111 responses



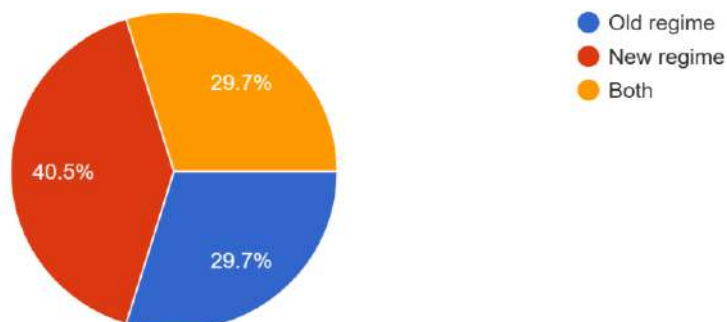
Interpretation:

This question aims to understand whether the respondent has knowledge about the major differences between the old and new tax regimes. It helps assess the level of awareness regarding tax slabs, deductions, exemptions, and overall tax benefits under both systems.

Question no. 5

3. Which regime do you find easier to understand and file ?

111 responses

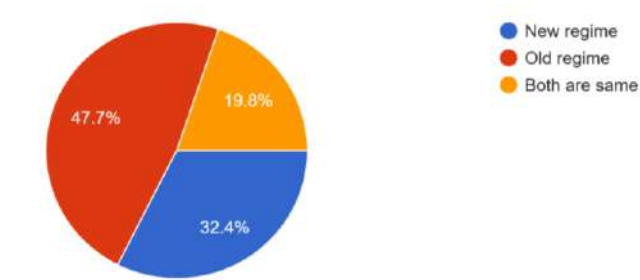


Interpretation:

This question seeks to identify the respondent's preference regarding the simplicity and clarity of the old and new income tax regimes. It helps in understanding which regime taxpayers find more convenient and easier to interpret in terms of rules, calculations, and compliance.

Question no.6

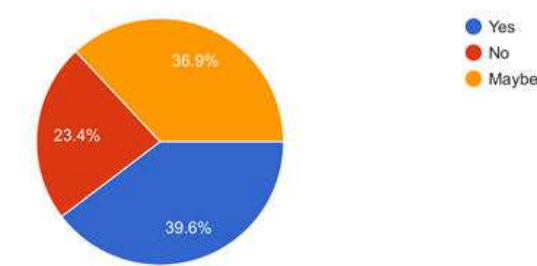
4. Which regime do you think offers more tax savings for you?
111 responses



Interpretation:
This question aims to understand the respondent’s perception about which tax regime provides greater financial benefit to them personally. It helps analyse individual tax planning preferences based on income level, deductions, and overall tax liability.

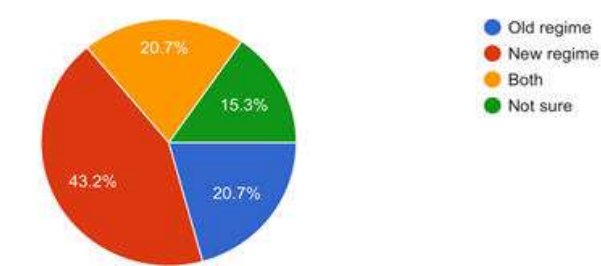
Question no. 7

5. Does the removal of major deductions in new regime discourage you from investing?
111 responses



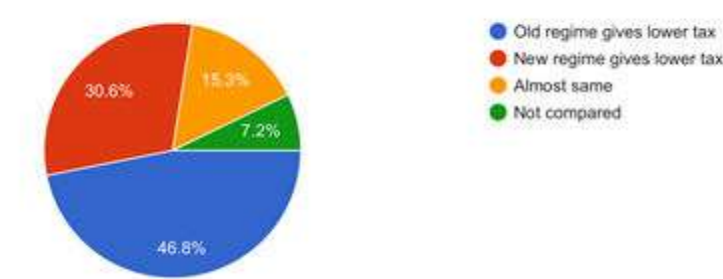
Interpretation:
This question seeks to understand whether the elimination of key deductions in the new tax regime affects the respondent’s motivation to invest in tax-saving instruments. It helps assess the impact of tax policy changes on individual saving and investment behaviour.

6. Which regime do you think is better for India's tax payers?
111 responses



Question no. 8

8. how does your tax liability differ when you compare both regimes?
111 responses



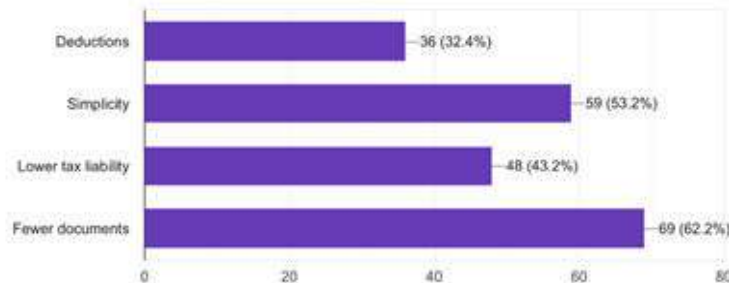
Interpretation:

This question aims to gather the respondent's opinion on which tax regime is more beneficial for the country and its taxpayers overall. It helps evaluate perceptions about fairness, simplicity, revenue generation, and long-term economic impact of both regimes.

Question no.9

7. What are the main reasons for choosing new regime?

111 responses



Interpretation:

This question aims to identify the key factors that influence a taxpayer's decision to opt for the new tax regime. It helps understand whether reasons such as lower tax rates, simplified structure, fewer compliance requirements, or personal income level play a role in their choice.

Question no.10

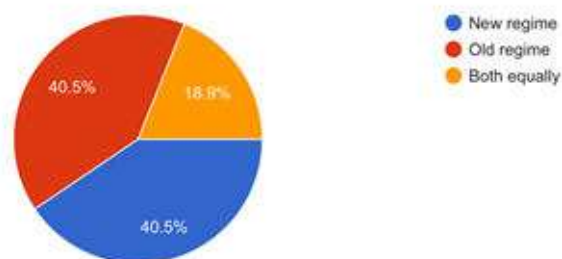
Interpretation:

This question aims to assess the difference in the respondent's actual tax burden under the old and new tax regimes. It helps analyse the financial impact of both regimes based on income level, deductions claimed, and applicable tax rates.

Question no.11

9. Which regime do you think benefits middle income earners the most?

111 responses



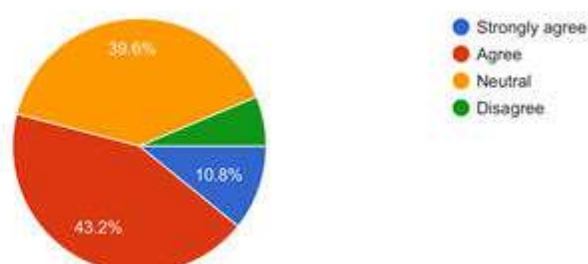
Interpretation:

This question aims to understand the respondent's opinion on which tax regime is more advantageous for middle-income earners. It helps evaluate perceptions about affordability, tax relief, deductions, and overall financial benefit for this income group.

Question no.12

10. Do you feel the new regime offers fewer opportunities for tax planning?

111 responses



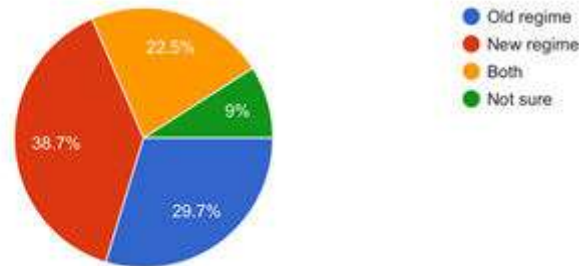
Interpretation:

This question aims to understand whether the respondent believes that the new tax regime provides limited incentives or options for tax-saving investments. It helps assess perceptions about how the structure of the new regime influences investment planning and financial decision-making.

Question no. 13

11. Which regime reduces the compliance burden more effectively?

111 responses



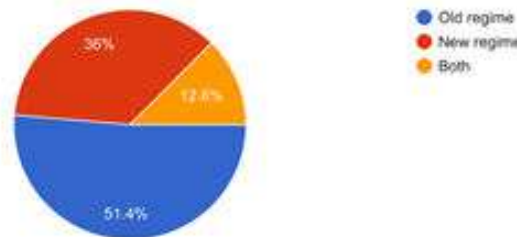
Interpretation:

This question seeks to evaluate the respondent's opinion on which tax regime simplifies procedures and reduces paperwork or documentation requirements. It helps assess perceptions regarding ease of filing, fewer deductions, and overall reduction in compliance burden.

Question no.14

12. Which regime supports long-term financial discipline (insurance, PF, savings) more effectively

111 responses



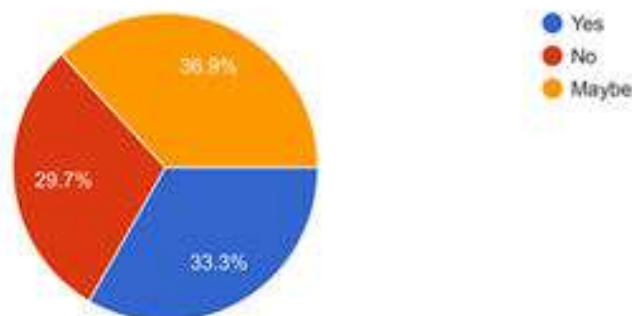
Interpretation:

This question aims to understand the respondent's view on which tax regime better encourages consistent savings and investment habits over time. It helps evaluate perceptions about how tax incentives, deductions, and policy structure influence long-term financial discipline.

Question no.15

13. Do you think new regime has an impact on retirement planning?

111 responses

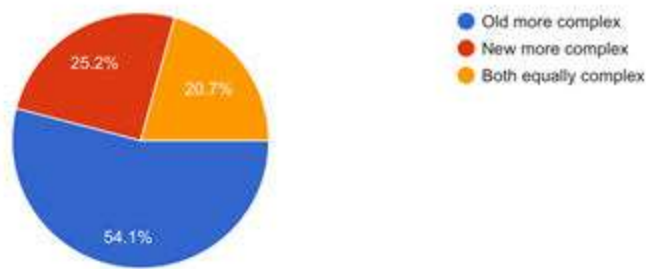


Interpretation:

This question seeks to understand whether the respondent believes that the new tax regime influences their retirement planning decisions. It helps assess the perceived impact of reduced deductions and fewer tax-saving incentives on long-term retirement investments and financial security.

Question no.16

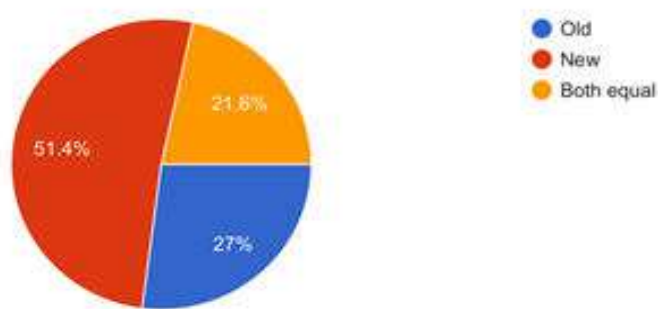
14. How would you compare the overall complexity of understanding both regimes?
111 responses



Interpretation:
This question aims to evaluate the respondent’s perception of the level of difficulty involved in understanding and calculating tax under both the old and new regimes. It helps assess which system is viewed as more complex in terms of rules, deductions, documentation, and filing procedures. This question aims to evaluate the respondent’s perception of the level of difficulty involved in understanding and calculating tax under both the old and new regimes.

Question no.17

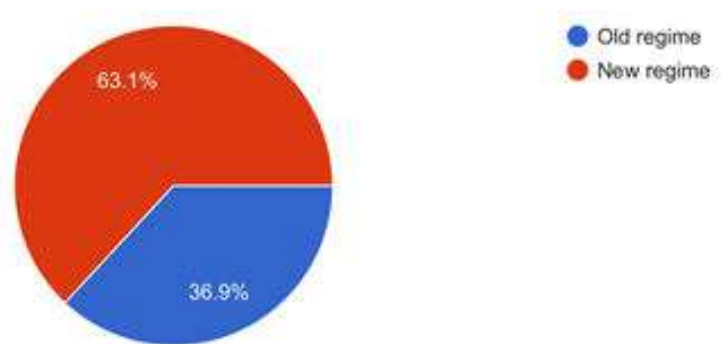
15. Which regime do you think benefits senior citizen more?
111 responses



Interpretation:
This question aims to understand the respondent’s opinion on which tax regime provides greater advantages to senior citizens. It helps assess perceptions regarding tax relief, higher exemption limits, deductions, and overall financial support available to elderly taxpayers under both regimes.

Question no.18

16. Which regime is more adaptable to future automation and online compliance?
111 responses

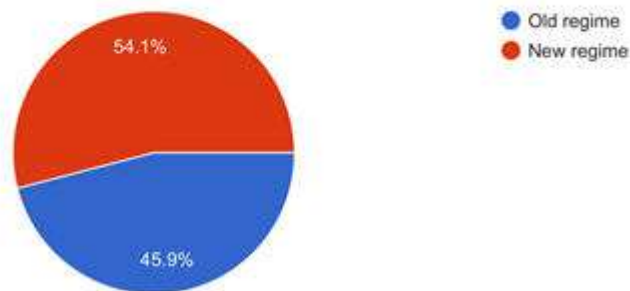


Interpretation:
This question seeks to understand the respondent’s opinion on which tax regime is better suited for future reforms and digital compliance systems. It helps assess perceptions about flexibility, ease of online filing, and compatibility with evolving tax administration technologies.

Question no.19

17. Which regime do you think in long run will reduce inequality among taxpayers?

111 responses



Interpretation:

This question aims to understand the respondent's view on which tax regime, in the long run, is likely to promote greater fairness and reduce income inequality among taxpayers. It helps evaluate perceptions about equity, progressive taxation, and balanced distribution of tax benefits.

CONCLUSION & SUGGESTIONS

Conclusion

The comparative study of the Old and New Income Tax Regimes highlights the government's effort to provide flexibility and simplify the taxation system in India. The Old Regime offers multiple deductions and exemptions, benefiting taxpayers who invest in tax-saving instruments such as LIC, PPF, ELSS, housing loans, and other eligible schemes. On the other hand, the New Regime provides lower tax rates with minimal deductions, making it simpler and more transparent. The choice between the two regimes depends on the income level, investment habits, and financial goals of the taxpayer. Therefore, neither regime is universally better; the suitability varies from individual to individual. The study indicates that the Old Regime is more beneficial for individuals who actively invest in tax-saving instruments and claim substantial deductions, whereas the New Regime is suitable for those with fewer investments and a preference for simplified filing. Therefore, the effectiveness of either regime depends upon the taxpayer's income structure, financial planning behavior, and long-term goals. The coexistence of both regimes enhances flexibility but also requires careful evaluation before selection.

Suggestions

1. Taxpayers should calculate their tax liability under both regimes before making a choice.
2. The government should provide clearer comparison tools to help individuals select the most beneficial regime.
3. Financial awareness programs should be conducted to educate citizens about tax planning strategies.
4. The tax structure should be periodically reviewed to maintain fairness and economic balance.
5. Simplification of compliance procedures can further improve taxpayer convenience.

REFERENCES

DIGITAL PAYMENTS AND FINANCIAL INCLUSION IN ENHANCING RURAL TOURISM EXPERIENCES IN MAHARASHTRA

Ms.Pradnya Dinesh Jadhav¹, Ms.Laxmi Guddu Gupta² and Mr. Niraj Kumar Mishra³

^{1,2}TYBMS Student, Seva Sadan College of Arts, Science & Commerce

³Research Scholar United World of Management Karnavati University, Gandhinagar, Gujarat.

ABSTRACT

The adoption of digital payment systems and the expansion of financial inclusion have emerged as important drivers in enhancing rural tourism experiences, particularly in developing regions such as Maharashtra. This study examines the role of digital payments in improving accessibility, convenience, and transparency in rural tourism destinations, while also assessing how financial inclusion supports local economic participation. The increasing use of mobile wallets, Unified Payments Interface (UPI), and online banking has enabled tourists to make seamless transactions in rural areas, reducing dependence on cash and increasing trust in local tourism services.

The study is based on secondary data collected from academic journals, government reports, and reliable online platforms. The study explores how digital payment adoption influences tourist satisfaction by improving service efficiency, safety, and overall travel convenience, while simultaneously empowering local communities by integrating them into formal financial systems. Findings indicate that digital payments contribute positively to tourists' perceptions of rural destinations and encourage higher spending and longer stays. However, challenges such as limited digital literacy, internet connectivity issues, and uneven infrastructure remain significant barriers. The study highlights the need for policy support, digital literacy programs, and infrastructure development to strengthen financial inclusion and promote sustainable rural tourism growth in Maharashtra.

Keywords:-Digital payments, Rural tourism, Digital literacy, Financial inclusion, Sustainable tourism.

INTRODUCTION

Tourism is one of the fastest-growing sectors contributing to economic development, employment generation, and cultural exchange. In recent years, rural tourism has gained prominence as travelers increasingly seek authentic experiences, cultural immersion, and nature-based activities. Rural tourism not only diversifies tourism offerings but also promotes balanced regional development by creating income opportunities for rural communities.

Maharashtra, one of India's most economically and culturally diverse states, has immense potential for rural tourism. The state is home to numerous villages known for agriculture, handicrafts, folk traditions, festivals, heritage sites, and eco-tourism destinations. Despite this potential, rural tourism in Maharashtra faces challenges such as inadequate infrastructure, limited access to financial services, and dependence on cash-based transactions.

The emergence of digital payments and financial inclusion initiatives has transformed the way economic activities are conducted in rural India. Government programs such as Digital India, Jan Dhan Yojana, and the expansion of UPI have accelerated the adoption of digital financial services. These developments have the potential to enhance rural tourism experiences by improving transaction convenience, ensuring transparency, and increasing trust among tourists and service providers. This paper seeks to analyze the role of digital payments and financial inclusion in strengthening rural tourism in Maharashtra.

In the context of rural tourism, digital payments and financial inclusion have the potential to significantly enhance tourist experiences while simultaneously empowering local communities. Digital payment systems offer tourists greater convenience, safety, and flexibility by enabling cashless transactions for accommodation, food, transportation, and purchase of local products. For rural tourism stakeholders, financial inclusion facilitates access to banking services, digital transaction records, and formal credit, enabling better financial management and business growth.

Moreover, the use of digital payments promotes transparency, reduces the risk of fraud, and increases trust between tourists and service providers. By integrating rural tourism activities with digital financial systems, destinations can improve service quality, encourage higher tourist spending, and support sustainable economic development. Understanding the role of digital payments and financial inclusion in enhancing rural tourism experiences, while acknowledging these challenges, is therefore essential for designing effective policies and strategies.

This study seeks to examine how digital financial services contribute to improving tourist satisfaction and promoting inclusive rural tourism development in Maharashtra, highlighting the need for coordinated efforts among policymakers, tourism authorities, financial institutions, and local communities.

OBJECTIVES OF THE STUDY

The present study aims to examine the role of digital payments and financial inclusion in enhancing rural tourism experiences in Maharashtra. The specific objectives of the study are as follows:

1. To analyze the role of digital payment systems in improving convenience, safety, and overall satisfaction of tourists visiting rural tourism destinations in Maharashtra.
2. To examine the extent to which financial inclusion contributes to the economic empowerment of rural tourism stakeholders such as homestay owners, local guides, artisans, and small vendors.
3. To study the impact of digital payments on transparency, trust, and efficiency in financial transactions within rural tourism activities.
4. To identify the key challenges and barriers faced by tourists and rural service providers in adopting digital payment methods in rural tourism areas.
5. To assess the contribution of digital payments and financial inclusion to sustainable rural tourism development and local economic growth in Maharashtra.
6. To suggest suitable measures and policy recommendations for improving digital payment adoption and strengthening financial inclusion in rural tourism destinations.

SCOPE OF THE STUDY

The scope of the present study is confined to examining the role of digital payments and financial inclusion in enhancing rural tourism experiences in the state of Maharashtra. The study focuses on understanding how the adoption of digital payment systems such as Unified Payments Interface (UPI), mobile wallets, debit cards, and online banking influences tourist convenience, satisfaction, and trust while traveling to rural tourism destinations. It also explores the extent to which financial inclusion initiatives enable rural tourism stakeholders—including homestay owners, local guides, artisans, transport providers, and small-scale vendors—to participate in the formal financial system and benefit economically from tourism activities.

The study primarily relies on secondary data sources such as government reports, academic journals, policy documents, and tourism-related publications to analyze existing trends, opportunities, and challenges associated with digital financial services in rural tourism. Geographically, the study is limited to rural areas within Maharashtra and does not extend to urban or metropolitan tourism destinations.

Additionally, the research emphasizes the impact of digital payments on service delivery, transaction transparency, and sustainable rural development rather than on advanced financial technologies or international tourism markets. While the study provides a comprehensive understanding of digital payments and financial inclusion in the context of rural tourism, it does not include primary field surveys or empirical data analysis, and its findings are intended to offer conceptual insights and policy-oriented recommendations for stakeholders involved in rural tourism development in Maharashtra.

REVIEW OF LITERATURE

The role of digital payments in transforming the tourism sector has been widely discussed in recent research. Digital payment systems, including UPI, mobile wallets, debit and credit cards, and online banking, have been found to improve transaction convenience, reduce reliance on cash, and enhance tourist satisfaction. According to Sharma and Singh (2020), the adoption of cashless payment methods in rural tourism not only increases the efficiency of transactions but also fosters trust between tourists and local service providers. Studies highlight that tourists increasingly prefer destinations where seamless digital payment options are available, as they reduce transaction risks and improve the overall experience. In addition, digital payments contribute to greater transparency in pricing, allowing tourists to make informed decisions and avoid potential conflicts or misunderstandings with rural service providers.

Financial inclusion has been identified as a crucial factor in promoting rural economic development and sustainable tourism. According to Kumar and Reddy (2019), access to formal financial services such as bank accounts, digital payments, and credit facilities empowers rural entrepreneurs, particularly homestay owners, artisans, and small vendors, by enabling them to manage finances efficiently, expand their businesses, and participate in the larger economy. Research also indicates that financial inclusion strengthens the capacity of rural communities to offer higher-quality services to tourists, which in turn increases tourist satisfaction and

promotes repeat visits. In the context of Maharashtra, government initiatives such as Digital India and Pradhan Mantri Jan Dhan Yojana have been instrumental in integrating rural tourism stakeholders into the formal financial ecosystem, thus supporting inclusive growth and local employment generation. While the benefits of digital payments and financial inclusion in rural tourism are widely acknowledged, there is limited research specifically addressing Maharashtra's rural tourism context. Most studies focus either on urban tourism or general financial inclusion without exploring the combined effect of digital payment adoption on tourist satisfaction and rural community empowerment. This gap indicates the need for research that examines how digital financial services can simultaneously enhance tourist experiences and promote sustainable rural tourism development in Maharashtra.

RESEARCH METHODOLOGY

The present study adopts a descriptive and analytical research design to examine the role of digital payments and financial inclusion in enhancing rural tourism experiences in Maharashtra. The research primarily relies on secondary data sources, as these provide a comprehensive overview of trends, policies, and challenges related to digital payment adoption, financial inclusion, and rural tourism development. Secondary data has been collected from various government publications, including reports from the Ministry of Tourism, the Reserve Bank of India, and the Maharashtra Tourism Development Corporation, as well as academic journals, research papers, policy documents, and credible online sources. This approach allows for a detailed analysis of the current state of digital payment adoption and financial inclusion, their impact on tourist satisfaction, and the extent to which they empower rural tourism stakeholders.

The study focuses on rural tourism destinations within Maharashtra, including villages and small towns known for cultural heritage, natural attractions, and community-based tourism activities. The research scope encompasses both the tourists' perspective—focusing on convenience, safety, satisfaction, and trust during transactions—and the service providers' perspective, including homestay owners, local guides, artisans, and small vendors, with emphasis on their access to banking, digital payment systems, and formal financial support. By examining these two perspectives, the study seeks to establish a comprehensive understanding of how digital financial services facilitate sustainable tourism growth and inclusive economic development in rural areas.

The methodology involves qualitative analysis of existing literature, reports, and case studies to identify key patterns, challenges, and opportunities. It also incorporates an examination of relevant policies and government initiatives that have promoted financial inclusion and digital payments in rural areas, such as Digital India, Pradhan Mantri Jan Dhan Yojana, and UPI-based payment systems. The study also critically evaluates barriers such as digital illiteracy, inadequate infrastructure, internet connectivity issues, and cybersecurity concerns, which affect both tourists and rural tourism stakeholders.

Overall, the research methodology combines descriptive, analytical, and policy-oriented approaches to provide a comprehensive examination of the topic. By systematically reviewing existing literature, reports, and statistical data, the study identifies the impact of digital payments and financial inclusion on tourist satisfaction, service provider empowerment, and sustainable rural tourism development in Maharashtra. The insights derived from this methodology are intended to inform policymakers, tourism authorities, financial institutions, and local communities on effective strategies to enhance the adoption of digital financial services and promote inclusive growth in the rural tourism sector.

DATA ANALYSIS AND INTERPRETATION

The analysis of secondary data indicates a strong and growing impact of digital payments and financial inclusion on rural tourism experiences in Maharashtra. According to reports from the Reserve Bank of India (2023) and the Ministry of Tourism, digital payment transactions in rural areas have increased significantly over the past five years, with mobile wallet transactions and UPI-based payments accounting for the majority of cashless transactions. This trend suggests that tourists visiting rural destinations are increasingly relying on digital payment methods, reflecting higher convenience, safety, and trust in cashless systems. The availability of multiple digital payment options, including QR code-based systems, mobile wallets, and internet banking, has made financial transactions in rural areas more efficient and transparent. For tourists, this reduces the need to carry cash, ensures price transparency, and facilitates smoother engagement with local service providers, which enhances overall satisfaction and encourages repeat visits.

From the perspective of rural tourism service providers, financial inclusion has enabled better participation in the formal economy. Secondary data from Maharashtra Tourism Development Corporation (MTDC) and rural development reports reveal that homestay owners, artisans, and local guides who have adopted digital payments are able to maintain transaction records, access banking services, and apply for small-scale credit facilities.

This formalization has contributed to increased revenue transparency, improved financial planning, and access to government-supported schemes, which in turn strengthens the capacity of rural communities to sustain and expand tourism services. Furthermore, financial inclusion has enhanced economic empowerment, particularly for women entrepreneurs in rural tourism, by allowing them to independently manage payments and gain recognition in the local and digital economy.

The analysis also highlights the challenges and barriers to widespread adoption of digital payments and financial inclusion in rural tourism. Despite progress in mobile connectivity and digital literacy programs, many villages in Maharashtra still face unreliable internet access, low smartphone penetration, and limited awareness about cybersecurity. Reports indicate that service providers in remote rural areas often rely partially on cash-based systems, which limits the seamless adoption of digital payments and reduces the potential benefits for tourists and the local economy. Additionally, cultural preferences for cash transactions and limited exposure to formal financial mechanisms create hesitation among both tourists and service providers in fully embracing digital financial solutions. These challenges underline the need for coordinated efforts by government agencies, financial institutions, and tourism authorities to enhance digital infrastructure, provide training, and promote awareness campaigns targeting rural communities and tourists alike.

Interpretation of the data suggests that digital payments and financial inclusion are closely linked to improved tourist satisfaction, economic empowerment of rural service providers, and sustainable development of rural tourism destinations. Digital payment systems have made transactions faster, safer, and more transparent, directly influencing the convenience and confidence of tourists. At the same time, financial inclusion allows rural communities to benefit from formal financial services, ensuring better income management, access to credit, and participation in government schemes. While the adoption is not uniform across all rural tourism destinations in Maharashtra, the positive correlation between digital financial services and enhanced rural tourism experiences is evident. The analysis indicates that strengthening digital infrastructure, improving financial literacy, and addressing connectivity issues are critical for maximizing the benefits of digital payments and financial inclusion in rural tourism.

DATA SOURCES

The present study relies primarily on secondary data sources to analyze the impact of digital payments and financial inclusion on rural tourism experiences in Maharashtra. Secondary data is essential for understanding large-scale trends, government policies, and existing research findings without conducting primary field surveys. The sources utilized for this study include government publications, research journals, policy documents, and credible online databases, providing a comprehensive overview of the topic from multiple perspectives.

- Government Reports and Publications
- Academic and Research Journals
- Online Databases and Reports
- Case Studies and Sectoral Reports

SAMPLE DESIGN

The sample design of the study outlines the target population, sampling unit, sampling technique, and sample size used to analyze the impact of digital payments and financial inclusion on rural tourism experiences in Maharashtra. Although this study primarily relies on secondary data.

- Target Population
- Sampling Unit
- Sampling Technique
- Sample Size
- Rationale for Sample Design

TOOLS AND TECHNIQUES

The study employs various tools and techniques to systematically analyze the impact of digital payments and financial inclusion on rural tourism experiences in Maharashtra. Since the study is primarily based on secondary data, the emphasis is on analytical and interpretive methods, rather than primary data collection. The tools and techniques have been chosen to ensure a comprehensive understanding of trends, patterns, and challenges in the adoption of digital financial services in rural tourism.

- Descriptive Analysis
- Comparative Analysis
- Content Analysis
- Statistical Interpretation
- Case Study Analysis
- Analytical Framework

LIMITATIONS OF THE STUDY

Despite its comprehensive approach, the present study has certain limitations that should be considered when interpreting the findings. First, the study relies primarily on secondary data sources, including government reports, research journals, and online databases. Second, the geographical scope of the study is limited to rural tourism destinations within Maharashtra. While the state offers diverse rural tourism experiences. Third, the study focuses on the adoption of digital payments and financial inclusion without considering the broader range of factors that influence rural tourism experiences, such as environmental sustainability, cultural sensitivity, infrastructure development, marketing strategies, or tourist behavior patterns. Fourth, the analysis of secondary data is subject to data availability and accuracy constraints. Variations in reporting methods, updates, and completeness of government or institutional data may influence the precision of conclusions drawn regarding digital payment adoption, financial inclusion, and tourism growth. Despite these limitations, the study provides valuable conceptual insights and policy-oriented recommendations for enhancing rural tourism experiences through digital payments and financial inclusion in Maharashtra.

HYPOTHESES OF THE STUDY

Based on the objectives and review of literature, the study proposes the following hypotheses to examine the relationship between digital payments, financial inclusion, and rural tourism experiences in Maharashtra. These hypotheses provide a framework for analysis and interpretation of the findings:

H1: Adoption of digital payment systems positively influences tourist satisfaction in rural tourism destinations.

H2: Financial inclusion of rural tourism stakeholders enhances their economic empowerment and ability to provide quality services.

H3: Digital payments improve transparency and trust in financial transactions between tourists and rural service providers.

H4: Challenges such as digital illiteracy, inadequate infrastructure, and connectivity issues limit the effective adoption of digital payments in rural tourism.

H5: Integration of digital payments and financial inclusion contributes to sustainable rural tourism development in Maharashtra.

FINDINGS OF THE STUDY

Based on the analysis of secondary data, the study identifies several key findings regarding the role of digital payments and financial inclusion in enhancing rural tourism experiences in Maharashtra.

- **Increasing Adoption of Digital Payments by Tourists:**-The study finds a significant increase in the use of digital payment methods among tourists visiting rural destinations. Reports from the Reserve Bank of India and the Ministry of Tourism indicate that tourists increasingly prefer cashless transactions for accommodations, local transport, handicraft purchases, and guided tours. Digital payments have improved convenience, reduced the need to carry cash, and enhanced the overall tourist experience. This supports the hypothesis that digital payment adoption positively influences tourist satisfaction in rural areas.
- **Financial Inclusion Empowers Rural Service Providers:**-Financial inclusion initiatives, such as bank account access under Pradhan Mantri Jan Dhan Yojana and UPI-based transaction facilities, have empowered rural tourism stakeholders. Homestay owners, artisans, local guides, and small vendors now have access to formal banking, credit facilities, and digital transaction records. This has enabled better financial management, increased transparency in revenue, and improved service quality. Women entrepreneurs in particular have benefited from financial inclusion, gaining greater autonomy and economic empowerment.
- **Digital Payments Promote Transparency and Trust:**-The findings indicate that the use of digital payments in rural tourism has increased transparency in financial transactions. Both tourists and service

providers report higher trust in cashless systems due to reduced risk of fraud, clear transaction records, and instant settlements. This has strengthened the relationship between tourists and local service providers, fostering confidence in rural tourism destinations.

- **Contribution to Sustainable Rural Tourism Development:**-The study finds a positive correlation between digital payment adoption, financial inclusion, and sustainable rural tourism development. Digital financial services facilitate higher tourist spending, improve service quality, and empower rural communities economically. In addition, increased transparency and traceable transactions contribute to better financial management and planning for tourism stakeholders, supporting inclusive and long-term rural development.
- Overall, the study confirms that digital payments and financial inclusion play a crucial role in enhancing tourist satisfaction, economic empowerment of rural service providers, and sustainable rural tourism development. However, addressing infrastructural and educational barriers remains critical for maximizing the potential benefits.

CONCLUSION

The present study highlights the critical role of digital payments and financial inclusion in enhancing rural tourism experiences in Maharashtra. Analysis of secondary data indicates that the adoption of digital payment systems such as UPI, mobile wallets, and debit cards has significantly improved convenience, transparency, and trust in financial transactions for both tourists and rural service providers. Tourists visiting rural destinations now experience greater satisfaction due to safer, faster, and cashless transactions, while rural entrepreneurs, homestay owners, artisans, and local guides benefit from improved financial management, access to credit, and inclusion in the formal financial system. However, the study also identifies several challenges that need to be addressed to maximize these benefits. Digital illiteracy, inadequate internet connectivity, limited smartphone penetration, and cultural preferences for cash transactions continue to hinder uniform adoption of digital payments across all rural destinations. Overall, the study concludes that the integration of digital payments and financial inclusion has a transformative impact on rural tourism in Maharashtra. When effectively implemented, these tools not only enhance tourist satisfaction but also empower local communities economically and promote sustainable, inclusive rural tourism development. The findings underscore the importance of continued investment in digital infrastructure, financial literacy programs, and policy measures to ensure that the benefits of cashless transactions and financial inclusion reach all rural tourism stakeholders, thereby strengthening Maharashtra's rural tourism sector as a whole.

SUGGESTIONS

Based on the analysis and findings of this study, several practical suggestions are proposed to strengthen the adoption of digital payments and financial inclusion in rural tourism in Maharashtra:

- Strengthening Digital Infrastructure
- Promoting Digital Literacy
- Expanding Financial Inclusion Initiatives
- Incentivizing Cashless Transactions
- Awareness Campaigns for Tourists
- Monitoring and Evaluation
- Collaboration Between Stakeholders

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DIGITAL LEARNING ANALYTICS FOR ENHANCING SELF-REGULATED LEARNING AMONG WORKING PROFESSIONALS: A CRITICAL REVIEW OF THEORETICAL FRAMEWORKS AND EMPIRICAL EVIDENCE

Mr. Pranav Prashant Godle¹ and Dr. Amit Aggrawal²

¹Research Scholar, Department of Commerce & Management, School of Commerce & Management Studies, Sandip University, Nashik, Maharashtra.
²Professor, Department of Commerce & Management, School of Commerce & Management Studies, Sandip University, Nashik, Maharashtra.

ABSTRACT

The fast implementation of digital learning platforms has changed professional learning, where learners gain control and must learn on their own (SRL). Learning analytics (LA) are data-driven insights into the behaviour of learners based on gathering, examining and interpreting patterns of interaction, measures of engagement, and performance. This review critically analyzes the empirical studies on the use of LA to facilitate SRL in working professionals, with focus on integrating theoretical models of SRL in analytics functionalities. The results show that having a collection of tools like dashboards, predictive alerts, personalized feedback, and resource recommendations help to improve goal setting, tracking, reflection, and strategy adjustment, which eventually lead to motivation, time management, and learning efficiency. Although it seems promising, there are still individualized support, long-term interaction, and scalability issues and the necessity to design theory-based, adaptable LA interventions that are effective in scaffolding self-regulated learning in online settings.

Keywords: Learning Analytics, Self-Regulated Learning, Digital Learning, Professional Development.

1. INTRODUCTION

The introduction of digital technologies into the physical space of higher education and professional learning has facilitated the mass gathering of the data about learners, including the manner of interaction, behavioral involvement, and the performance results. These online records include frequency of logs, time duration spent on learning resources, examinations, and discussions, which provide reliable information on learner behavior on online learning machines. Learning analytics (LA) has become a data-driven method which uses data science and artificial intelligence techniques of calculating and interpreting such trace data to optimize the learning process.

Table 1: Research Study

Author(s) & Year	Study Focus	Methodology / Data Source	Key Findings	Contribution to LA & SRL
Alhazbi et al., 2024 [1]	Systematic review of LA tools for measuring SRL	Review of empirical LA studies in higher education	Identified common SRL indicators, analytic techniques, and measurement challenges	Offered an integrated understanding of how LA is used to measure SRL across studies
Matcha et al., 2019 [2]	Learning analytics dashboards in self-regulated learning	Systematic review of empirical studies	Dashboards improve monitoring, motivation, and engagement; highlight design impact on SRL	Demonstrated the role of dashboards in supporting self-regulated learning processes
Sharma et al., 2024 [3]	Self-regulation and shared regulation in collaborative digital learning	Systematic review of adaptive digital learning environments	Collaborative learning environments support co-regulation; self-regulation enhanced via shared activities	Showed how LA can facilitate both individual and shared regulation in digital settings

Heikkinen et al., 2023 [4]	Supporting SRL with LA interventions	Systematic literature review	Interventions such as dashboards, predictive alerts, and feedback enhance learner engagement and metacognition	Validated effectiveness of LA interventions in enhancing SRL in higher education
Wang et al., 2022 [5]	Theory-driven learning analytics	Scoping review of empirical studies	Integration of theoretical models improves interpretability and meaningfulness of LA	Highlighted the importance of theory-informed LA for accurate measurement of SRL constructs

Learning analytics has developed as an important discipline over the last ten years in order to comprehend, forecast, and enhance learner behavior in the digital world. One of the most frequently used definitions of LA is the process of measuring, gathering, analyzing and reporting information concerning learners, and their settings with the aim of comprehending and maximizing learning and the learning conditions. Learning analytics facilitates more responsive and adaptable learning by providing real-time feedback and personalized feedback.

Behavioral data on its own, however, will never be able to tell enough about the quality of learning or cognitive development. Therefore, the combination of learning science frameworks and education theories is required to make sure that the interpretation of analytics is pedagogically significant. Over the last few years, there has been an increase in the need to found learning analytics on validated and established learning theories to improve their validity, interpretability and applicability.

The Self-regulated learning (SRL) forms an effective theoretical framework to explain how learners actively manage their thoughts, motivation and behaviour. SRL does not attribute the difference in individual learning outcomes to deficit in intelligence but attributes it to the ability of learners to plan, monitor and adjust their learning plans. Notably, SRL is a skill that can be learnt and trained and it is therefore an appropriate focus of analytics- based interventions.

The recent studies are more likely to discuss the overlap of learning analytics and self-regulated learning especially in the context of online and blended learning. Learning analytics provides behaviour-based, continuous and unobtrusive information about SRL processes, in comparison with traditional self-report measures. This review is a critical analysis of empirical research using learning analytics in the measurement and improvement of SRL, and particularly to working professionals in the field of digital learning environments. It recognizes important analytic indicators; it maps them into SRL constructs and it points out the discontinuities between theory and practice in existing analytics applications.

2. BACKGROUND

The history of this review puts the research in the broader context of digital platform-driven transformation of professional learning [6]. It dwells upon the evolving aspect of learner responsibility in virtual environments, the development of data-driven learning assistant systems, and the ever-increasing necessity of structured self-control among working people. In this section, I will provide the contextual impetus to investigate the learning analytics as a means of facilitating self-regulated learning without attempt to expound the theoretical subject at length.

2.1 Digital Learning and the Shift Toward Learner Autonomy

The growth of online and technology mediated learning has considerably transformed the traditional way of instructions. Digital platforms are flexible in terms of time, speed, and access, which probably makes them especially appealing to working professionals. Nonetheless, such flexibility shifts more of the burden to the learners, who have to independently take care of their learning schedules, keep themselves motivated, and ensure that they remain engaged.

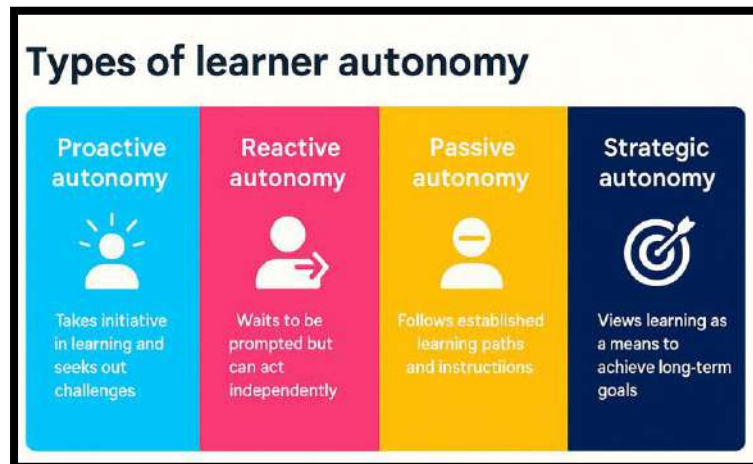


Figure 1: Components of Learner Autonomy and Their Impact on Learning Outcomes [7]

In contrast to a face-to-face learning atmosphere, the digital learning situation does not impose a constant instructor control and immediate external control in most of the cases. This led to an increased reliance of the success of learners on their planning, monitoring and evaluation of their learning activities. This movement towards learner autonomy indicates the significance of the mechanisms that might help the learners regulate their learning processes effectively.

2.2 Emergence of Learning Analytics as a Data-Driven Support Mechanism

The prevalence of online learning systems has led to the production of massive amounts of data on learner interactions, such as engagement records, navigation history, test results and participation history [8]. Learning analytics has become the reaction to such a data-saturated environment, which attempts to convert raw data on behaviour into useful information, which can be used to inform learning and decision-making.

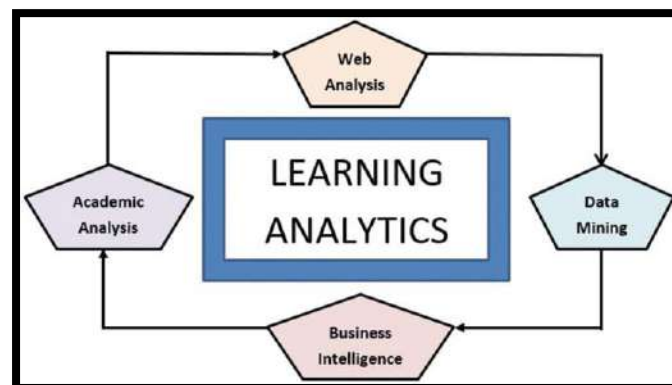


Figure 2: Overview of Learning Analytics in Digital Learning Environments [9]

Learning analytics, originally concerned with descriptive reporting, now has the feature of predictive and adaptive analytics like early-warning systems, personalized feedback, and recommendation engines. These technologies are not only useful in the monitoring of institutions but are also becoming resources of support to learners. Nonetheless, unless proper conceptual underpinning is done, analytics applications have a tendency to focus on activity indicators instead of relevant learning activities.

2.3 Need for Analytics-Supported Self-Regulation Among Working Professionals

Working professionals are a special learner group with unique features, such as insufficient time, conflicting professional and personal tasks, and learning goals orientation. As much as digital platforms are more accessible and flexible, the self-regulatory capabilities needed to maintain engagement and learning outcomes in digital platforms are robust.

Learning analytics fulfills this requirement by providing guided, structured and data-driven instruction in non-custodial learning settings. Dashboards, progress indicators, alerts, and customized feedback decrease uncertainty and mental load, and allow learners to make an informed decision regarding their learning strategies [10]. Learning analytics provides an environment where self-regulated learning can be developed and realized through making learning processes visible and actionable, which in turn facilitates the application of self-regulated learning implications to the working professionals.

3. THEORETICAL FOUNDATIONS OF LEARNING ANALYTICS AND SELF-REGULATED LEARNING

In this section, the theoretical background of the study is laid out, by synthesizing the existing conceptualizations of self-regulated learning, and exploring how these models can be correlated with the functions of learning analytics. It is explicit on theory, unlike the background context, and offers a formulation of the context of the application of theory to empirical usage of the same in subsequent sections.

3.1 Self-Regulated Learning as a Cyclical Learning Process

One of the key concepts of learning sciences is self-regulated learning (SRL), as it describes the way learners can effectively manage their cognitive, motivational, and behavioural functions. SRL is usually viewed as a cyclic activity which encompasses setting of goals, strategic planning, monitoring of progress, reviewing the results and adaptive adjustment of strategies [11]. SRL does not consider learning as a passive process of information intake but instead focuses on agency and deliberate control of the learner.



Figure 3: Distinguishing Self-Regulated Learning from Self-Paced Learning in Analytics-Driven Environments [12]

SRL takes up various dimensions, among them, cognitive regulation (use of strategy and monitoring), motivational regulation (self-efficacy, task value, persistence), and behavioural regulation (time and effort management). The interaction between these dimensions is dynamic, which allows the learner to react to the feedback and the surrounding demands during the learning process.

3.2 Major Theoretical Models of Self-Regulated Learning

There are multiple powerful models that can be used to give a systematic insight into the processes of SRL. Zimmerman model takes the form of a three-stage cycle, which involves forethought, performance and self-reflection in its conceptualization of SRL. The forethought stage includes setting and planning goals, performance stage includes strategy implementation and monitoring, and self-reflection stage includes self-assessment and responding.

According to the model provided by Winne and Hadwin, SRL is a recursive information-processing system, meaning that it defines tasks, goals, strategies to be implemented, and adapts itself to feedback. This model focuses on the feedback loop and the dynamic aspect of the learning regulation. The framework proposed by Pintrich also conceptualizes SRL as a more cyclical process but specifically models motivational regulation in the planning, monitoring, control, and reflection stages of the process.

These models combined make SRL a feedback-based, and adaptive process, which offers a robust theoretical basis of analytics-based learning support.

3.3 Alignment of Learning Analytics with SRL Theory

Learning analytics is rather related to SRL theory as it gives outward representations of internal regulatory activities. SRL constructs are operationalized through analytics tools, e.g. dashboards, engagement metrics, and feedback systems that make planning, monitoring, and reflection visible and actionable. Anticipatory regulation is supported by predictive analytics and alerts, whereas self-evaluation is supported by progress reports and comparisons.

This conceptual correspondence indicates that learning analytics can be used as a scaffold in self-regulated learning, especially in online space where students are required to control their learning on their own. With the foundation of the analytics design and SRL theory, it will be possible to transform data-driven interventions beyond the surface tracking of activities in order to substantially assist in regulating learning.

Table 2: Alignment of Self-Regulated Learning Models with Learning Analytics Support

SRL Model	Key SRL Phases	Core Emphasis	Learning Analytics Support
Zimmerman	Forethought, Performance, Self-Reflection	Goal setting and evaluation	Dashboards, progress summaries
Winne & Hadwin	Task definition, enactment, adaptation	Feedback-driven regulation	Behavioural trace analysis
Pint rich	Planning, monitoring, control, reflection	Motivation and effort regulation	Engagement analytics, alerts

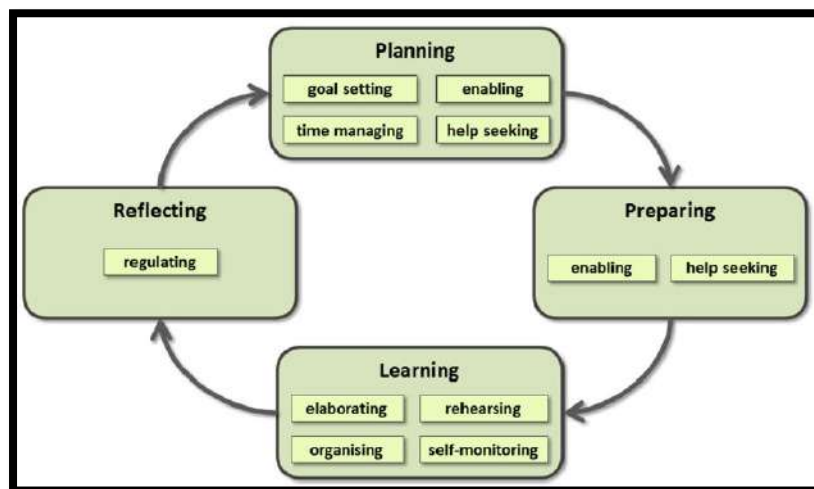
The table illustrates how major SRL models align with learning analytics functionalities, demonstrating that analytics systems are theoretically well positioned to support planning, monitoring, and reflection processes central to self-regulated learning.

4. EMPIRICAL APPLICATIONS OF LEARNING ANALYTICS FOR ENHANCING SELF-REGULATED LEARNING

This part summarizes the empirical studies on the practical implementation of learning analytics tools to assist in self-regulated learning (SRL) in online learning. It deals with analytics-based applications, the quantifiable effect of these applications on working professionals, and the mapping of the analytic functions to the known stages of SRL [13]. Combined, these studies show that the theoretical SRL constructs are operationalized in data driven interventions.

4.1 Learner Analytics Applications Supporting Self-Regulated Learning

According to the consistent reports of empirical studies, learning analytics applications are found to be important in supporting the core SRL processes including goal setting, monitoring, reflection and strategy adjustments [14]. The tools used and commonly practiced are learning dashboards, performance prediction models, feedback and guidance system and resource recommendation engine.

**Figure 4:** Four-Phase Model of the Self-Regulated Learning Process [15]

Learning dashboards represent the degree of engagement of learners, their progress, time-on-task, and the results of assessments, and allow them to monitor their progress on a continuous basis. Performance prediction models refer to models that predict future performance using historic and behavioral information and determine at-risk learners to promote a proactive control of learning strategies [16]. The feedback and guidance systems offer automated messages, which are personalized to aid in reflection and corrective action, and resource recommendation systems propose customized learning materials that rely on the needs and performance trends of the learners.

There is empirical evidence to suggest that such applications are most useful when they offer timely, actionable and customized information as opposed to being static. Analytics tools can externalize self-regulatory cues that can be internalized with time by translating behavioral trace data into meaningful insights.

4.2 Impact on Self-Regulated Learning for Working Professionals

Research that dwells on working adults reveals that learning analytics can contribute greatly towards SRL by resolving the issues of time demands, competing demands, and motivation.

Environments that utilize analytics will help professionals to have realistic goals matching with career goals, make progress in the most efficient way, and prioritize tasks in learning according to the data-based feedback.

Metacognitive awareness can be enhanced through dashboards and engagement metrics, which makes learning behavior visible, and predictive alerts and reminders, which minimize procrastination and the lack of engagement [17]. Individual feedback and resource suggestions will enable effective implementation of the strategy so that learners do not need to invest in alternative skills that do not align with the proposed strategy. The consistent report on empirical findings involves an increase in motivation, persistence, time management, and learning efficiency in working professionals who use analytics-enabled platforms.

In general, learning analytics serves as a well-organized self-regulation platform that facilitates independent learning and makes it flexible enough to meet the needs of professional learners.

4.3 Mapping Learning Analytics to Self-Regulated Learning Phases

Empirical studies are increasingly mapping the learning analytics features to the well-known SRL stages to show the theoretical correspondence [18]. The analytics tools also aid the forethought step by helping with goal-setting, planning, and readiness analysis by summarizing progress and revealing skill gaps. The performance phase will be supported by real-time monitoring dashboards, engagement tracking, and automated feedback to allow the learners to control their effort and change strategies. The analytics reports and visual summaries in the self-reflection stage enable the assurance of results and provide informed decisions regarding the next learning cycles.

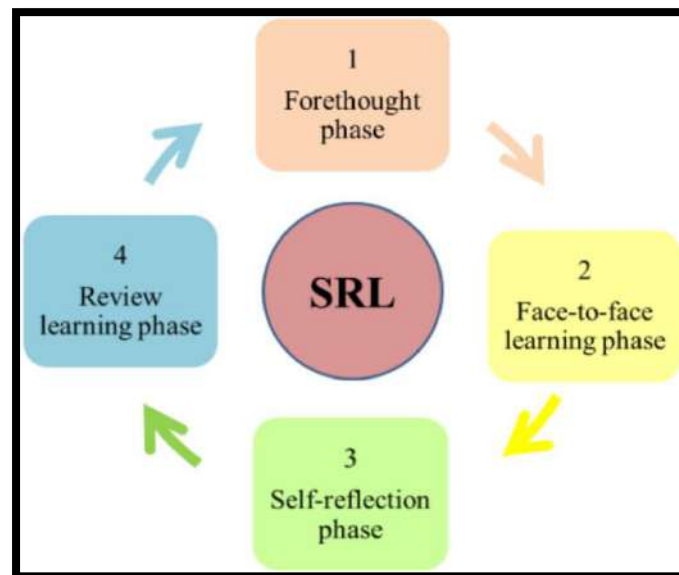


Figure 5: Dashboard-Driven Self-Regulated Learning Model for E-Book-Based Learning [19]

Tables and figures in empirical studies commonly illustrate these mappings by linking specific analytics indicators—such as time-on-task, resource usage, and assessment trends—to SRL constructs [20]. This alignment strengthens the validity of analytics-enabled interventions and highlights their role in operationalizing SRL theory within real-world digital learning contexts.

Table 3: Empirical Mapping of Learning Analytics Applications to SRL Phases [21]

SRL Phase	Analytics Applications	Observed Outcomes
Forethought	Goal-setting dashboards, skill-gap analysis	Improved planning and goal clarity
Performance	Engagement tracking, predictive alerts, feedback	Better monitoring and strategy adjustment
Self-Reflection	Progress reports, performance comparisons	Enhanced evaluation and adaptive learning

The table demonstrates how empirical learning analytics applications align with SRL phases [22]. By supporting each phase with targeted analytics tools, digital platforms enable continuous self-regulation and evidence-based learning decisions, particularly for working professionals [23].

5. CONCLUSION

Learning analytics (LA) is very relevant in improving self-regulated learning (SRL) among working professionals in online learning [24]. Dashboards, predictive alerts and personalized feedbacks and recommendations to resources aid in goal setting, monitoring, reflection and strategy re-alignment so that learners can effectively manage time, maintain motivation and prioritize tasks. Theoretical SRL models such as the framework by Zimmerman, Winne and Hadwin and Pintrich fit very well with LA functionalities which implies that it could help bring internal cognitive, motivational as well as behavioural processes into view and action [25]. The implementation of theory-based strategies into LA makes it more educational and useful.

Even though difficulties still persist on personalised support, long-term engagement, and wider applicability, LA offers a systematic, data-driven framework that enables practitioners to manage their learning, ameliorate results and adjust themselves to digital learning settings efficiently.

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A STUDY ON CONSUMER BEHAVIOUR IN ONLINE SHOPPING

¹Pranshu Pandey and ²Dr Gulabchand K Gupta¹Research Scholar, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan²Principal, Seva Sadan College of Arts, Science & Commerce, Ulhasnagar, Dist. Thane**ABSTRACT**

Online shopping is rapidly growing, and it's being used by many segments of society. Today, people are shopping 24 hours a day from the comfort of their homes and taking advantage of discount coupons and festive offers. Consumer behaviour in online shopping has become a significant area of study due to the rapid growth of e-commerce and digital technologies. With increasing access to smartphones and the internet, consumers are shifting from traditional retail to online platforms that offer personalized experiences, wider product choices, and time-saving benefits. Now day's people get tempted to buy products in online shopping and while buying the product they only read the reviews and ratings. Some people's marketed offline, which helped them learn to interact with people and understand customer service. Customer body language also provided insights into the type of product they were looking and people used to teach their way of talking and how to behave with the customer along with selling their goods and taking the business forward in their market. In online shopping, customers purchase the product only after seeing its review rating. The more we think we're advancing in online technology. The study aims to analyse the behaviour of consumer towards Online Shopping.

Keywords: Consumer, Behaviour, Online, Shopping, Purchase

INTRODUCTION

Online shopping behavior involves consumers browsing, comparing and purchasing items through digital platforms, largely influenced by convenience, competitive pricing and user reviews.

Some of Key factors influencing this behavior include:

- (1) Website usability
- (2) Security, trust
- (3) Prompt delivery

This process includes :

- (a) Need identification, research
- (b) Evaluation of alternatives
- (c) Purchase and post-purchase assessment.

Recently Online shopping is growing, and it's being used by many segments of society. Today, people are shopping 24 hours a day from the comfort of their homes and taking advantage of discount coupons and festive offers.

Online Consumer Behavior have some of important point

- (1) Availability of information
- (2) Access and convenience
- (3) Mobile commerce
- (4) Security
- (5) Trust

Consumer behavior in online shopping refers to how individuals search for, evaluate, purchase and review products or services through digital platforms. With the growth of e-commerce, understanding online consumer behaviour has become essential for businesses.

Factors influencing Online Consumer Behaviour

(1) Psychological factors

Motivation (need for convenience, discounts, variety)

(2) Personal factors

Age, gender, income

(3) Social factors

Social media influence

Online reviews and ratings

(4) Cultural factors

Values, traditions

Online Buying Decision Process

- Recognition of problem
- Search of information
- Take decision purchase

RELATED LITERATURE:

The research has been noted as “How consumer behavior in online shopping”

A research was conducted by Singh, A.K., & Sailo, M. (2013). Consumer behavior in online shopping: a study of Aizawl. International Journal of Business & Management Research, 1(3),45-49.

Another research has been conducted based on Consumer behavior and online shopping by the Kaur, H., & Kochar, R.(2018). A review of factors affecting consumer behavior towards online shopping. International Journal of Engineering and Management Research (IJEMR), 8(4), 54-58.

The evolution of e-commerce and the rapid proliferation of online shopping platforms have significantly transformed consumer behavior. A substantial body of literature has emerged to explore the various dimensions of consumer behavior in the context of online shopping. This review aims to synthesize and critically assess key studies that contribute to our understanding of consumer behavior in online shopping.

Conducted a comprehensive review of factors affecting consumer behavior towards online shopping. Their study highlighted a wide range of variables, including convenience, trust, perceived risk, and personalization, that impact consumer decision-making in the online shopping realm. Their findings provide valuable insight into the multifaceted nature of consumer behavior.

RESEARCH TECHNIQUE:

The survey has been conducted using Google form various age group of students, teachers and other people the person response receive data from Mumbai Ulhasnagar. The responder has response to questionnaire of 1. Do you Shop Online. , How do you do most of your shopping. , Do you like online shopping. , Which method do you used to Pay for online shopping. , Which website platform do you used for online shopping. , Do you think online shopping is better than offline shopping. , Will you continue shopping online in the future. , Have you ever faced problems while shopping online. , Does online shopping save time & money. , Do online reviews affect your buying behaviour.

We have received total 74 number of persons responded the maximum number of persons responded 20 & below age group i.e., 91.9 % and the minimum number of responded from 21 to 35 above age group i.e., 8.1 % as given. The 68.9 % female responder and 31.1 % make responder have been participated in the survey.

DATA ANALYSIS AND DISCUSSION

A. Do you Shop Online.
73 responses

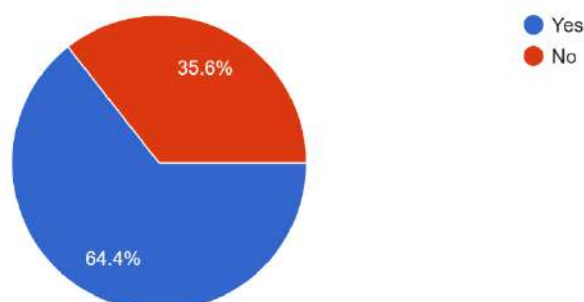


Figure 1: Do you shop online

This chart shows the responses to the question “Do you shop online?” based on 73 respondents.

- **64.4%** of the people answered **Yes**, meaning most respondents do shop online.
- **35.6%** answered **No**, meaning a smaller portion does not shop online.

Overall, the majority of respondents prefer or use online shopping, while about one-third still do not shop online.

B. How do you do most of your shopping.

73 responses

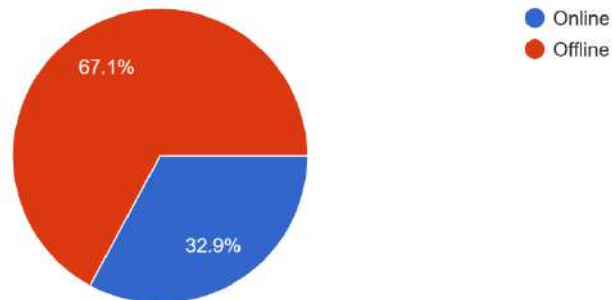


Figure 2: How do you do most of your shopping

This chart shows how respondents do most of their shopping based on 73 responses, indicating that **67.1%** of people prefer **offline shopping**, while **32.9%** mainly shop **online**, which suggests that although online shopping is popular, a larger majority still prefers shopping through physical stores.

C. Do you like online shopping.

73 responses

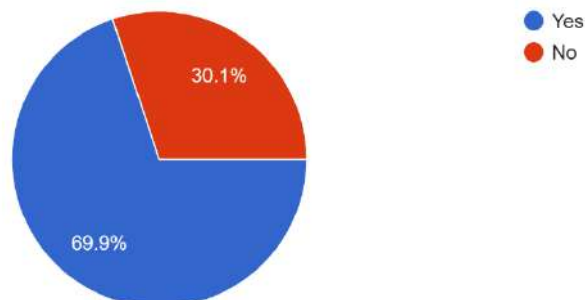


Figure 3: Do you like online shopping

This figure shows the responses to the question “**Do you like online shopping?**” based on a survey of 73 people. The pie chart indicates that a large majority of respondents, about **69.9%**, answered “**Yes,**” meaning they like online shopping, while **30.1%** answered “**No.**” Overall, the data clearly suggests that most people prefer or enjoy online shopping compared to those who do not.

D. Which method do you used to Pay for online shopping.

73 responses

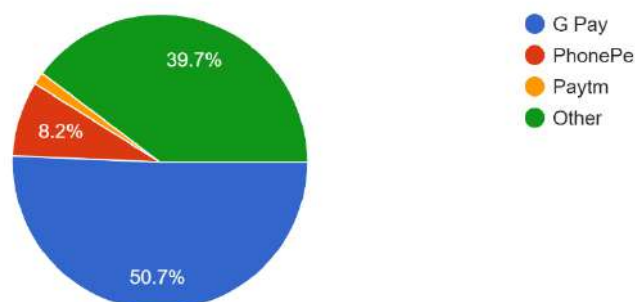


Figure 4: Which method do you use to pay for online shopping

This figure represents the responses of 73 people to the question “**Which method do you use to pay for online shopping?**” The pie chart shows that the most commonly used payment method is **G Pay**, chosen by **50.7%** of

respondents. This is followed by “Other” payment methods at 39.7%. PhonePe is used by 8.2% of the respondents, while Paytm accounts for a very small proportion. Overall, the chart indicates that digital payment platforms, especially G Pay, are the preferred choice for online shopping payments.

E. Which website platform do you used for online shopping.

73 responses

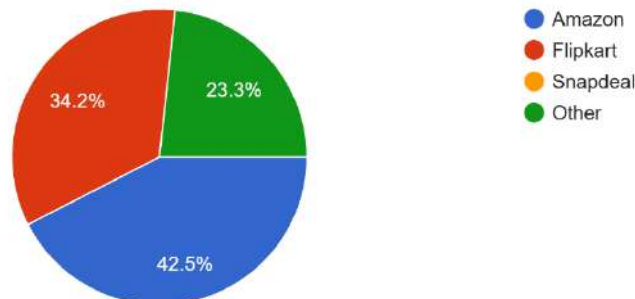


Figure 5: Which website platform do you use for online shopping

This figure shows the responses of 73 participants to the question “Which website platform do you use for online shopping?” The pie chart indicates that Amazon is the most preferred platform, used by 42.5% of respondents. Flipkart is the second most popular choice with 34.2% of users. Additionally, 23.3% of respondents use other online shopping platforms, while Snapdeal accounts for a very small or negligible share. Overall, the data suggests that Amazon and Flipkart dominate as the primary online shopping platforms among the respondents.

F. Do you think online shopping is better than offline shopping ?

73 responses

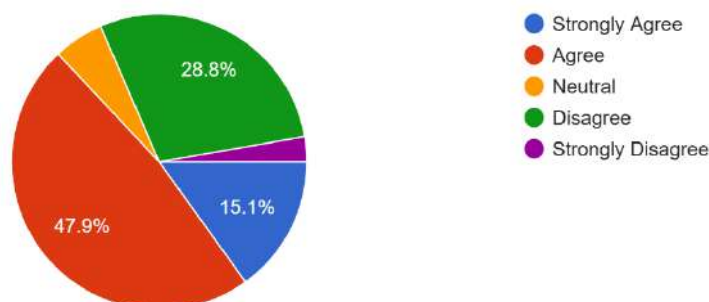


Figure 6: Do you think online shopping is better than offline shopping

This figure presents the opinions of 73 respondents on whether online shopping is better than offline shopping. The pie chart shows that 47.9% of respondents agree and 15.1% strongly agree that online shopping is better, indicating a clear positive attitude toward online shopping. A smaller portion of respondents remain neutral. On the other hand, 28.8% disagree and a very small percentage strongly disagree with the statement. Overall, the results suggest that although most respondents favour online shopping over offline shopping, a noticeable group still prefers or supports offline shopping.

G. Will you continue shopping online in the future ?

73 responses

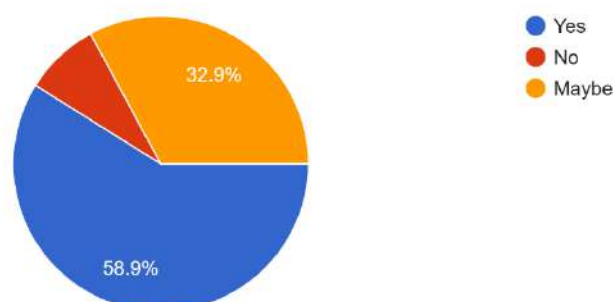


Figure 7: Will you continue shopping online in the future

This figure shows the responses of 73 participants to the question “Will you continue shopping online in the future?” The pie chart indicates that a majority of respondents, 58.9%, answered “Yes,” showing a strong intention to continue online shopping. Meanwhile, 32.9% of respondents selected “Maybe,” suggesting some uncertainty about future online shopping habits. Only a small percentage answered “No.” Overall, the results suggest that most people are likely to continue shopping online in the future, with very few clearly rejecting it.

H. Have you ever faced problems while shopping online ?
73 responses

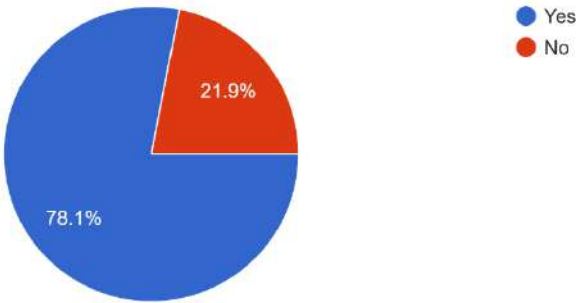


Figure 8: Have you ever faced problems while shopping online

This figure shows the responses of 73 participants to the question “Have you ever faced problems while shopping online?” The pie chart indicates that a large majority of respondents, 78.1%, answered “Yes,” meaning they have experienced problems during online shopping. In contrast, 21.9% of respondents answered “No,” indicating they have not faced any issues. Overall, the data suggests that while online shopping is popular, many users still encounter problems when shopping online.

I. Does online shopping save time & money.
73 responses

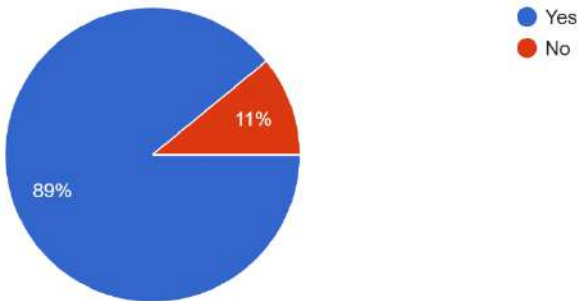


Figure 9: Does online shopping save time & money

This figure illustrates the perceptions of 73 respondents regarding whether online shopping saves time and money. The pie chart clearly shows a strong consensus in favour of online shopping, with 89% of participants agreeing that it helps save both time and money. Only 11% of respondents disagreed with this statement. This overwhelming majority suggests that convenience, reduced travel time, easy price comparison, and access to discounts are key factors influencing positive perceptions of online shopping. Overall, the data indicates that online shopping is widely viewed as an efficient and cost-effective alternative to traditional offline shopping.

J. Do online reviews affect your buying behaviour ?
73 responses

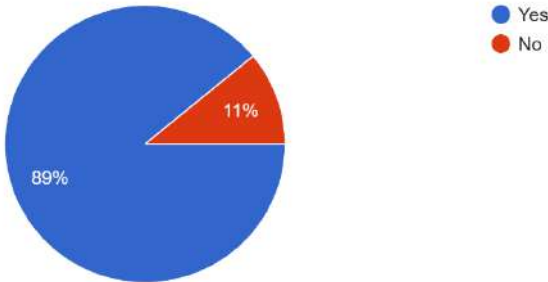


Figure 10: Do online reviews affect your buying behaviour

This figure shows responses to the question “**Do online reviews affect your buying behaviour?**” from 73 respondents, where **89%** answered yes, indicating that online reviews strongly influence purchasing decisions, while only **11%** said no, suggesting that very few consumers are unaffected by online reviews.

K. Would you recommend online shopping to others ?

73 responses

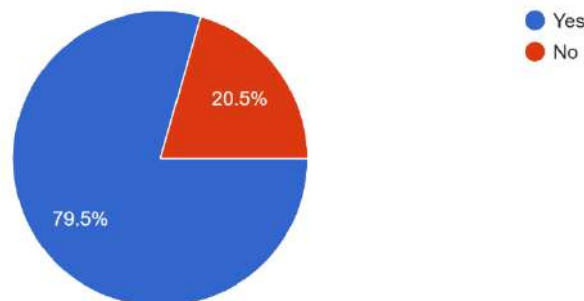


Figure 11: Would you recommend online shopping to others

This figure shows responses to the question “**Would you recommend online shopping to others ?**” from 73 respondents, where **79.5%** recommended online shopping to other & while only **20.5%** not recommended online shopping to other.

CONCLUSION

It has been observed from the survey that the 64% aware the online shopping where the 32% of consumer aware for offline shopping. And 30 % of consumer does not like to be online shopping . And 69% of customer is like online shopping. This figure represents the responses of 73 people to the question “**Which method do you use to pay for online shopping?**” The pie chart shows that the most commonly used payment method is **G Pay**, chosen by **50.7%** of respondents. This is followed by “**Other**” payment methods at **39.7%**. **PhonePe** is used by **8.2%** of the respondents, while Paytm accounts for a very small proportion. Overall, the chart indicates that digital payment platforms, especially G Pay, are the preferred choice for online shopping payments.

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THE IMPACT OF DIGITAL MARKETING IN CONSUMER BUYING BEHAVIOUR FOR VEHICLE**¹Ravikumar Gupta and ²Dr Gulabchand K Gupta**¹Research Scholar, Hashmatrai & Gangaram Himathmal Mansukhani, Institute of Management, Ulhasnagar 421003²Principal, Seva Sadan College of Arts, Science & Commerce, Ulhasnagar, Dist. Thane²drkgupta@yahoo.co.in**ABSTRACT**

The rapid growth of digital technologies has significantly transferred marketing practise in the automobile sector. With the increasing use of digital platforms such as social media, search engines, company websites, email, mobile applications and online reviews, consumers now rely deeply on digital information while making vehicle purchase decision. This study examines the impact of digital marketing on consumer buying behaviour for vehicles. Using social media networks such as Facebook, YouTube, Twitter, Instagram, LinkedIn and so on, the companies endorse goods, services and brands. Engagement marketing is the method of forming meaningful interactions with potential and returning customers based on the data collect over time. By implementing digital marketing strategy, marketers can collect valuable insights into target audience behaviours while opening the door to new methods of customer engagement. The research aims to analyse how various digital marketing tools influence consumer awareness, perception and final purchase decisions.

Keywords: Digital Marketing, Social Media, Consumer, Behaviour, Purchase, Vehicles

1. INTRODUCTION

The digital marketing refers to advertising delivered through digital networks such as search social media, search engines, websites and mobile applications. Using digital marketing networks such as YouTub, Instagram, Facebook, and other platforms the companies endorse services, goods, and brands. The consumer depends on digital means to research products of various vehicles and other goods. Now day digital marketing is the massive system of networks to which marketers just onboard their products, brands, and advertisement. An engagement digital marketing is the technique of forming meaningful interactions with potential and returning customers based on the data collect over time. By attracting customers in a digital landscape, build brand awareness and place business at the forefront when the customer is ready to buy. By implementing digital marketing strategy, sellers can collect valuable insights into target audience behaviors while opening the door to new methods of customer engagement with the help of artificial intelligence. This paper analyses the consumer buying behavior influence by digital marketing platform.

2. RELATED LITERATURE

Rajiv Kaushik (2016) explained that the Indian companies are using digital marketing for competitive gain. The Achievement of marketing campaign cannot be solely achieved by digital marketing only. Startups that use digital marketing many times got failed. The study shows precautions to be taken for effective implementation of digital marketing to reap tremendous potential to increase in sales.

Charles Gibson (2018) study the most effective digital marketing methods, provide companies with valuable tools to target a larger audience, using a combination of emerging technologies and some aspects of traditional marketing. The study provided individuals, companies, organizations, businesses and researchers, with digital marketing strategies to increase visibility to their target market.

Rakesh Pandit and Anshu Chauhan (2020) explain the Digital Marketing industry in India is spread to almost all the business sectors. Some of the applications of E-Marketing are shopping and online banking, order tracking, payment systems and content management. The power of digital marketing allows geophysical barriers to disappear making all consumers and businesses on earth potential customers and suppliers. It is known for its ability to allow business to communicate and form a transaction anywhere and anytime.

Ravikumar Gupta and Swati Sabale (2022) study the Social Media influence on consumer behaviour approaches. Dr Gulabchand K Gupta & Ravikumar Gupta (2025) investigated the consumer purchasing behaviour on two wheeler vehicles influence by social media advertisement and friend endorsement in the social media platform.

3. RESEARCH TECHNIQUES

The survey has been conducted using Google Form from various age group from Mumbai, and Thane district areas. They have been responded on questionnaire (i) use of internet (ii) most use digital platforms (iii) awareness of new vehicles on digital marketing (iv) Social Media content provides useful information abouts

vehicles (v) Online reviews and ratings influence vehicle purchase decision (vi) Digital marketing helps compare prices and features of vehicles (vii) Influencer or celebrity endorsement on digital marketing platforms affect buying decision and (viii) other information related to digital marketing and vehicles. The responded with different age group persons in the survey. The maximum number of responded from age group of 18 to 20 years that is 64.1% as given in the Table No 1. The 64.1% female and 35.9% male responded have been participated in the digital marketing and social media survey.

Table 1: Age group of participants

Age group	Percentage
18 to 20 years	64.1
21 to 35 years	28.6
36 to 50 years	3.6
51 years and above	3.6

In the survey, 80.7% participants are undergraduate qualification whereas 3.1% participants are professional qualification as shown in the Table No 2.

Table 2: Education qualification status of participants

Education Qualification	Percentage
School Level	1.0
Undergraduate	80.7
Postgraduate	15.1
Professional	3.1

4. DATA ANALYSIS AND DISCUSSION

4.1 Use of Digital Platform

It has been observed from the survey that the 85.9% of responders are using digital platform social media and 9.4% of responders are using search engines. The 0.5% of responder is using online reviews and forums as shown in the figure 1.

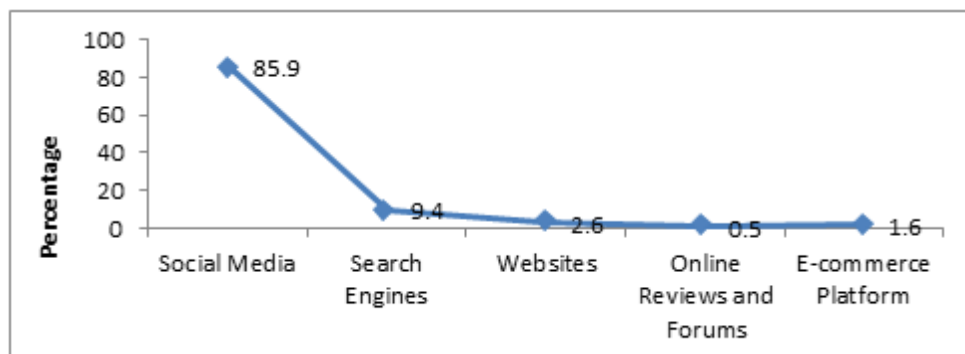


Figure 1: Digital Platform Uses

4.2 Digital Platform provides useful information

It has been seen from survey that the digital platform and social media content related to the vehicles provides useful information. The 62.5% of responders have been agreed that digital platform and social media content related to the vehicles provides useful information where as 4.7% disagreed on the same point as shown in the figure 2. This may be because of maximum numbers of responders are using digital and social media platform.

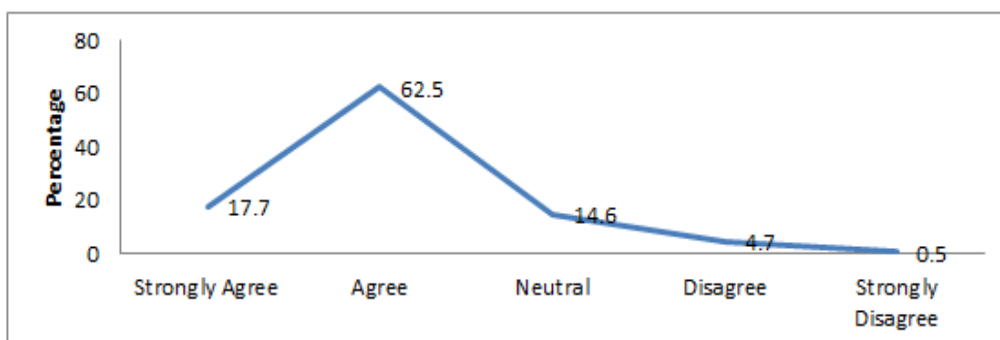


Figure 2: The responders views on digital platform provides useful information

4.3 Effect of Digital Marketing on purchase of vehicles

The 56.3% of responder have said that the digital marketing increases confidence before purchasing vehicles and 54.2% agreed that digital marketing plays an important role in vehicle buying decision. Whereas 5.2% disagreed on important role of digital marketing on buying decision as shown in figure 3. This shows that the digital marketing plays an important role purchase of vehicles.

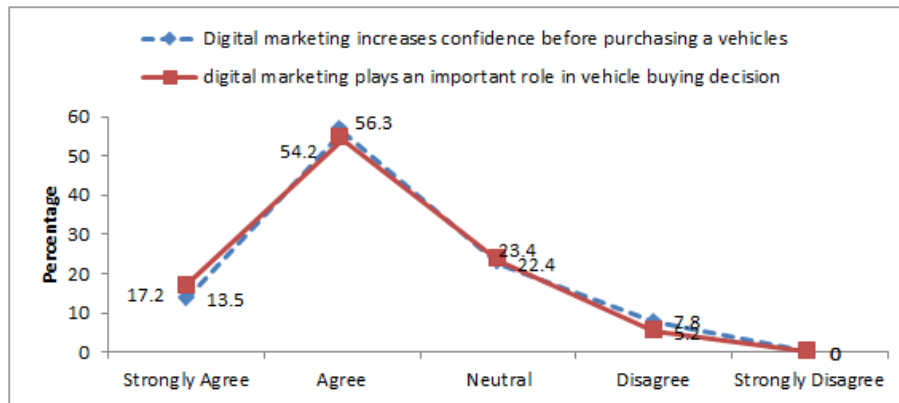


Figure 3: Influence of digital marketing on purchase of vehicles

4.4 Digital marketing influence on consumer buying behaviour

It has been observed from the survey that 38% of responders on influenced the buying behaviour by social media advertise, 27.6% by online reviews and 19.3% by You tube videos as indicated in figure 4.

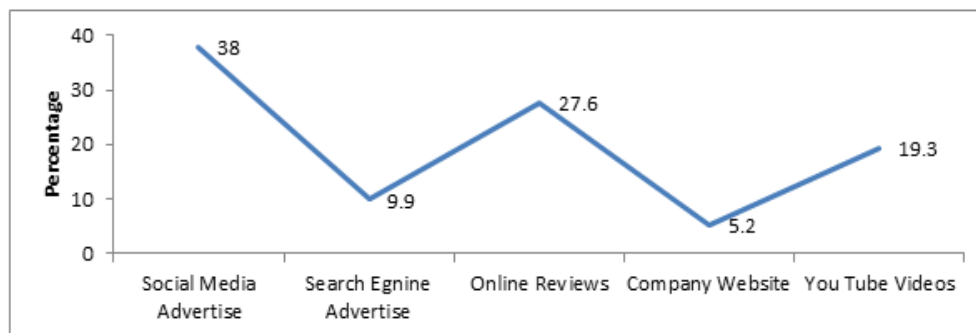


Figure 4: Role of Digital marketing on vehicle purchase decision.

4.5 Role of Digital Marketing Content

The 63.5% of responders agreed that they have purchased or planned to purchase a vehicle after seeing digital marketing content. Whereas 36.5% disagreed the role of digital marketing content as shown in the figure 5.

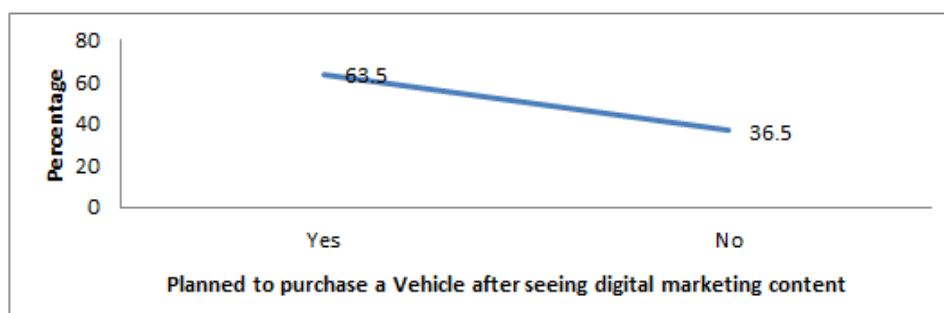


Figure 5: Role of digital marketing content on vehicle purchase.

5. CONCLUSION

It has been seen from the survey that the 85.9% of responders are using digital platform social media and 9.4% are using search engines. The 62.5% of responders have been agreed that digital platform and social media content related to the vehicles provides useful information. The 56.3% of responder have said that the digital marketing increases confidence before purchasing vehicles and 54.2% agreed that digital marketing plays an important role in vehicle buying decision. It has been observed from the survey that maximum responders buying behavior is influenced by the social media advertise. The maximum number of responders agreed that they have purchased or planned to purchase a vehicle after seeing digital marketing content. This shows that the digital marketing plays an important role in consumer buying behaviour for Vehicle.

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A COMPARATIVE STUDY OF GIS-BASED AND TRADITIONAL TEACHING IN GEOGRAPHY SUBJECT

¹Nishant Surte and ²Prof. Dr. Renuka Shewkani

Seva Sadan's College of Education (Autonomous), Ulhasnagar

¹nishantsurte@gmail.com and ²rshewkani@gmail.com**ABSTRACT**

This study investigated whether GIS-enhanced instruction was associated with greater learning gains than conventional textbook teaching for the geography unit "Location and Extent". A quasi-experimental, post-test only design compared two intact class sections (N = 140) taught the same curriculum on India and Brazil; one group received GIS-based instruction while the control group received traditional instruction. The outcome was a 20-mark objective post-test. Descriptive and inferential analyses showed that the GIS group achieved higher mean post-test scores than the textbook-only group, a mean difference of 2.0 marks on a 20-mark test (10 percentage points). These results are consistent with prior work indicating modest positive effects of geospatial technologies on spatial learning when activities are well scaffolded and closely aligned with objectives (Favier & van der Schee, 2014; Ma et al., 2023). However, because instruction was delivered to intact classes and no baseline pretest was administered, causal inference is limited (Bernhäuserová et al., 2022; National Research Council, 2006). The findings therefore offer preliminary evidence that classroom GIS can support short-term gains in map skills and spatial understanding; replication using cluster-aware randomisation, pretests and delayed retention measures is recommended (Song et al., 2023; Bednarz, 2004).

Keywords: GIS, Education, Traditional methods, Spatial Learning

INTRODUCTION

Education in Geography subject emphasises development of spatial thinking of understanding location, extent, hemispheric position and spatial relationships using maps and other geographic representations (National Research Council, 2006). Geographic Information Systems (GIS) have been increasingly used in school geography because they allow interactive layering, measurement and exploration of maps rather than reliance on static textbook images (Favier & van der Schee, 2014). Empirical work indicates GIS can improve understanding of spatial concepts and map skills, with effects dependent on how GIS is integrated and taught (Ma et al., 2023; Song et al., 2023).

However, much research examines specialised GIS lessons or heterogeneous topic sets rather than routine classroom units. There is limited evidence directly comparing GIS-based instruction with traditional instruction for everyday units such as Location and Extent, especially when learning is assessed immediately after instruction (Ma et al., 2023; Bernhäuserová et al., 2022). The Location and Extent unit (latitude/longitude, hemispheres, extent, neighbouring countries, basic map-work) is well suited to GIS-based exploration and to a controlled classroom comparison (Favier & van der Schee, 2014).

This study therefore asks whether GIS-based instruction produces higher immediate post-instruction performance than traditional instruction for the Location and Extent unit. Two intact class sections (N = 140; 70 per group) were compared using a post-test-only control-group design. The outcome was performance on an immediate 20-mark unit test which included map-based tasks. The GIS and textbook-only conditions followed identical learning objectives and lesson scripts; the difference was the use of structured GIS activities in the GIS group in place of selected textbook tasks.

1.1 NEED OF THE STUDY

- Instructional decisions about adopting GIS in routine classroom units (rather than specialised electives) require evidence that GIS provides measurable benefits for common geography topics such as *Location and Extent*.
- Existing research often examines GIS using heterogeneous content or small samples; this study controls content and assessment by focusing on a single, well-defined unit (India and Brazil).
- The unit emphasises spatial concepts such as latitude, longitude, hemispheres and extent that GIS can represent dynamically. A direct comparison clarifies whether these factors lead to improved immediate learning and map skills.
- Findings will help teachers and school administrators decide whether the additional time, training and technological resources required for GIS are justified for routine geography instruction.

1.2 AIMS AND OBJECTIVES

Aim

To examine whether students taught using GIS instruction achieve higher immediate post-test scores, map-work scores and engagement levels than students taught using traditional instruction in the Location and Extent unit (India and Brazil).

Specific Objective

- To compare mean immediate post-test scores between the GIS group and the Textbook-only group.

1.3 DEFINITIONS OF IMPORTANT TERMINOLOGIES

- Location and Extent (unit): The curriculum topic covering hemispheric location, latitudinal and longitudinal range (e.g., India: 8°4'N–37°6'N, 68°7'E–97°25'E; Brazil: 5°15'N–33°45'S, 34°47'W–73°48'W), national capitals, neighbouring countries and basic historical context.
- Traditional instruction: Delivery using the printed lesson pages (clues, country pages for India and Brazil, map figures, exercises) plus lecture, discussion and worksheets without GIS tools.
- GIS-enhanced instruction: Delivery of the same unit content using structured GIS activities aligned to lesson objectives.
- Extent of a country: The latitudinal and longitudinal limits that describe the mainland territorial span (as recorded on supplied maps).
- Map work tasks: Classroom activities requiring interpreting and marking accurate locations on map.
- Map literacy / Spatial skills: Ability to interpret map-based representations (identify hemispheres, locate capitals, read lat/long).
- Immediate post-test: The unit test administered immediately after completion of instruction; this is the primary outcome measure of the study.

1.4 ASSUMPTIONS AND HYPOTHESES

Assumptions

1. Both groups received identical learning objectives, instructional content and assessment; only the mode of instruction differs.
2. Lessons were delivered using scripted plans; GIS tasks were scaffolded for novice users and require access to a web-enabled device (desktop, laptop, or tablet) running a modern browser (Chrome, Firefox, Edge, or Safari) and a stable internet connection.
3. The immediate post-test was considered a reliable measure of the unit's factual, conceptual and map-work learning outcomes.
4. Attrition was expected to be minimal because the test is administered immediately after instruction.
5. Students' prior exposure to GIS was recorded and considered during analysis if imbalances occur.
6. No pretest was administered to avoid test sensitisation; this limits baseline comparability and precludes causal inference.

Hypotheses: Students taught using GIS will score significantly higher on the immediate post-test than students taught using traditional instruction.

1.5 SCOPE AND LIMITATION

Scope

- Unit: *Location and Extent* using India and Brazil as case studies.
- Population: Two intact class sections of the same grade/course at one school (n = 70 per group).
- Duration: A single instructional unit (approximately 2–4 weeks) followed by an immediate post-test; a delayed retention test may be administered later.
- Outcomes: Immediate post-test scores
- Setting: Regular classroom with access to student devices or a computer lab for the GIS group.

LIMITATIONS

1. Findings are limited to the specific unit, sample and instructional context and may not generalise to other topics or settings.
2. Availability of devices, internet access, or software issues may affect implementation fidelity.
3. Some contamination between groups may occur through informal student interaction.
4. The unit test focuses on targeted learning outcomes and may not capture higher-order spatial inquiry skills.
5. Immediate post-testing measures short-term learning and does not directly assess long-term retention.
6. Absence of a pretest limits direct control over baseline differences between groups.

REVIEW OF RELATED LITERATURE

Meta-analytic and classroom research converge on three main findings relevant to this study. First, GIS and other geospatial technologies produce positive effects on cognitive outcomes for spatial content (latitude/longitude, extent, hemispheres, neighbouring countries), particularly when tasks allow plotting coordinates, viewing boundary/water-body layers and measuring extents directly (Favier & van der Schee, 2014; Song et al., 2023; Ma et al., 2023). Ma et al. (2023) report a medium positive effect overall, with larger gains when tasks are tightly aligned to learning objectives.

Second, spatial-thinking theory explains why GIS can aid learning: making spatial relationships visible and manipulable helps students connect abstract concepts (e.g. latitude/longitude, extent) to map representations (National Research Council, 2006; Favier & van der Schee, 2014). Classroom studies show scaffolded GIS lessons yield more accurate student maps and stronger relational reasoning than traditional instruction (Favier & van der Schee, 2014; Song et al., 2023).

Third, non-cognitive benefits such as greater engagement and improved digital/spatial literacy are reported when interactive maps and local data are used, which can increase time-on-task for map exercises (Bednarz, 2004; Ma et al., 2023). Implementation factors that moderate GIS effects include scaffolded activities closely matched to unit objectives, teacher preparation and simple step-by-step worksheets to minimise technical problems and instructional time loss (Favier & van der Schee, 2014; Bernhäuserová et al., 2022; Ma et al., 2023). Based on this evidence, best practice for classroom comparisons is to (a) align GIS tasks exactly with the unit checklist, (b) provide stepwise worksheets so students focus on geography rather than software, and (c) report lesson duration and fidelity while using scored map tasks to detect GIS-specific gains (Favier & van der Schee, 2014; Bernhäuserová et al., 2022; Ma et al., 2023).

DESIGN OF THE STUDY / METHODOLOGY**3.1 DESIGN**

A quasi-experimental post-test-only control-group design compared GIS-based instruction with traditional instruction for the Location and Extent unit (case studies: India and Brazil). Two intact class sections from the same school were selected by convenience and assigned to conditions according to existing timetables; individual random assignment was not implemented. No pretest was administered; groups were tested immediately after instruction.

3.2 PARTICIPANTS AND SAMPLING

The sample comprised two intact class sections ($n = 70$ each; total $N = 140$) of students enrolled in the same grade and geography course, following a common curriculum. Convenience sampling from a single school determined selection and group assignment.

3.3 INSTRUCTIONAL MATERIALS AND FIDELITY

Lesson plans for both conditions were scripted to ensure identical content coverage, learning objectives and instructional time. The textbook-only condition used prescribed textbook explanations, printed political maps and written exercises. The GIS condition covered the same objectives but substituted structured GIS activities and digital maps for selected textbook tasks. Scaffolding and stepwise worksheets were provided to reduce time spent on software logistics.

3.4 TOOLS AND TECHNIQUES

The primary outcome was a 20-mark unit test administered immediately after instruction. The test comprised four sections: Section A — factual knowledge; Section B — conceptual understanding; Section C — application (numerical/procedural tasks on latitudinal extent and hemispheric location); Section D — map-work

and spatial reasoning. An answer key and marking scheme were prepared in advance. Map-work artefacts and GIS outputs were scored for location accuracy, correct use of latitude/longitude and labelling clarity.

Procedure

1. Permission and consent were obtained from the school and participants.
2. Each group received the scripted instruction for the unit, with equal duration and coverage.
3. The unit test and map-work artefacts were collected immediately after instruction under standardised test conditions.
4. Responses were scored using the prepared marking scheme and entered for analysis.

3.5 DATA ANALYSIS

Descriptive statistics (means, standard deviations) were calculated for post-test scores. Independent-samples *t*-tests compared the textbook-only and GIS groups on the unit test and mapped skill scores.

3.6 VALIDITY AND LIMITATIONS

The post-test-only design and absence of a pretest preclude direct measurement of baseline equivalence and learning gains. Immediate post-testing reduces attrition and memory-decay threats but limits conclusions to short-term outcomes rather than long-term retention. Potential moderating factors (teacher effects, technical issues, lesson fidelity) were documented for interpretation of observed differences (Ma et al., 2023; Bernhäuserová et al., 2022).

RESULTS

This section presents the results of the independent-samples *t* test conducted to examine differences in immediate post-test performance between students taught using traditional instruction and those taught using GIS Group instruction.

4.1 DESCRIPTIVE STATISTICS

Table 1: *Achievement Test Scores*

Descriptive statistics for the immediate post-test scores (maximum = 20 marks) are presented in Table . The GIS group obtained a higher mean score than the textbook-only group.

Table: Descriptive statistics for post-test scores by instruction type

Method	Mean (M)	Std. Deviation	95% CI	Min	Max
GIS Group	11.81	5.08	10.60–13.03	3	20
Textbook-only Group	9.8	5.69	8.44–11.16	1	20

Students taught using the GIS-based learning method obtained higher mean scores ($M = 11.81$, $SD = 5.08$) compared to those taught using the Textbook method ($M = 9.80$, $SD = 5.69$). The 95% confidence intervals indicate that the true mean for GIS lies between 10.60 and 13.03, while for the textbook-only group it lies between 8.44 and 11.16. The variability in both groups is comparable, as reflected by similar standard deviations. Skewness values are close to zero, suggesting approximately normal distributions in both groups.

4.2 Table: Assumption Checks (Levene's Test and Skewness Values)

F	df1	df2	Sig.
1.079	1	138	0.301

Group	Skewness
GIS	0.066
Textbook	0.178

Levene's test for equality of variances was conducted to assess the assumption of homogeneity of variance. The result was not statistically significant, $F(1, 138) = 1.079$, $p = .301$, indicating that the assumption of equal variances was satisfied. Normality was examined using skewness statistics. Skewness values were small (GIS = 0.066; Textbook = 0.178), suggesting approximate symmetry. More formal normality checks (e.g., Shapiro–Wilk) were not conducted. Levene's test indicated homogeneity of variance; skewness values suggested approximate normality. More robust normality checks (e.g., Shapiro–Wilk) were not reported.

4.3 INFERENCE ANALYSIS

Table 4: Descriptive Statistics and Independent Samples t-Test Results:

Group	N	Mean (M)	SD
GIS	70	11.81	5.08
Textbook-only	70	9.8	5.69

t	df	Sig. (2-tailed)	Mean Difference (GIS – TB)	95% CI
2.21	138	0.029	2.01	[0.21, 3.81]

An independent samples t-test was conducted to compare achievement scores between students taught using GIS and those taught using textbook-only. There was a statistically significant difference between the two groups, $t(138) = 2.21$, $p = 0.029$. Students in the GIS group ($M = 11.81$, $SD = 5.08$) scored significantly higher than students in the textbook-only group ($M = 9.80$, $SD = 5.69$). Because assignment occurred at the class level (two clusters) and no pretest was administered, these inferential results should be interpreted as preliminary and associative rather than definitive.

4.4 EFFECT SIZE

Table 5: Cohen's d Effect Size for Post-Test Score Comparison:

Effect Size	Value	Interpretation
Cohen's d	0.37	Small to Moderate

Cohen's $d = 0.37$ indicates a small-to-moderate effect size according to conventional benchmarks ($0.20 = \text{small}$, $0.50 = \text{medium}$, $0.80 = \text{large}$). This suggests that the GIS-based instruction produced a modest but meaningful improvement in post-test scores compared to traditional instruction.

TESTING OF HYPOTHESIS

Objective: To compare the mean achievement scores of students taught using GIS-based instruction (Treatment 1) and traditional instruction (Treatment 2).

H₀: There is no significant difference in the mean achievement scores of students taught using GIS-based instruction and traditional instruction.

H₁: There is a significant difference in the mean achievement scores of students taught using GIS-based instruction and traditional instruction.

Table X: Comparison of Mean Achievement Scores

Variable	Group	Mean	SD	SE (diff)	DF	Obtained t value	Table / Critical Value	Significance
Achievement Score	GIS group	11.81	5.08	0.91	138	2.21	0.01 (2.62)	Significant At 0.05 level
	Traditional group	9.8	5.69				0.05 (1.98)	

Table X: Additional Statistical Results for Independent Samples t-Test (N = 140)

Interpretation: The obtained t value (2.210) is greater than the critical value at the 0.05 level of significance ($df = 138$). The two-tailed p-value (0.0287) is less than 0.05. Therefore, the difference between the mean achievement scores of Treatment 1 and Treatment 2 is statistically significant at the 0.05 level.

Conclusion: As per the above data, the null hypothesis is rejected. There is a statistically significant difference between students taught using GIS-based instruction and those taught using traditional instruction. Students in the GIS group obtained higher mean scores than students in the traditional group.

4.5 FINDINGS

The analysis revealed that GIS-based instruction was associated with higher immediate post-test scores relative to the Textbook-only condition. This relationship was statistically significant in student-level analyses but should be interpreted in light of the study's design limitations. Levene's test and skewness indicated that the data were roughly equal in variance and fairly symmetric at the student level. However, because students were assigned in intact classes (two groups), the independence assumption for student-level t-tests was not met. Therefore, the results should be interpreted as exploratory rather than conclusive.

The independent samples t -test indicated a statistically significant difference between groups and the effect size suggested a small to moderate practical impact. These findings suggest that GIS-based instruction is more effective than traditional textbook-based teaching in improving students' academic performance.

DISCUSSION

The present study investigated whether GIS-enhanced instruction led to higher immediate post-test performance than textbook-only group when teaching the geography unit *Location and Extent*. An independent-samples t test revealed a **statistically significant difference** between the two instructional groups, with students in the GIS group achieving higher post-test scores than those in the textbook-only group, $t(138) = 2.21, p = 0.029$.

The significance of the t test indicates that the observed difference in mean scores is unlikely to have occurred by chance alone. The GIS group outperformed the textbook-only group by an mean difference of 2.0 marks on a 20-mark test (10 percentage points). The 95% confidence interval for the mean difference did not include zero, further confirming the statistical significance of the result. This provides empirical support for rejecting the null hypothesis and accepting the alternative hypothesis that GIS-enhanced instruction improves immediate learning outcomes relative to traditional instruction.

The statistically significant t test result suggests that GIS contributed positively to students' understanding of spatial concepts assessed in the unit, including latitude and longitude, extent, hemispheric location and map-work skills. These findings align with prior research demonstrating that GIS supports spatial learning by allowing students to visualise, manipulate and interact with geographic data rather than relying solely on static representations (Favier & van der Schee, 2014; National Research Council, 2006).

Although the effect size associated with the significant t test was small to moderate, it is educationally meaningful in the context of a short instructional unit and an immediate assessment. The significance of the t test is particularly notable because the intervention involved routine classroom teaching rather than extended or specialised GIS training. These findings suggest that, in this single-school sample and for immediate testing, well-scaffolded GIS activities may be associated with modest improvements.

5.1 LIMITATIONS

Despite the statistically significant t test result, several limitations should be acknowledged. First, the study employed a post-test-only design, which limits the ability to directly measure learning gains from baseline. While the significant difference suggests an instructional effect, pre-existing differences between groups cannot be entirely ruled out.

Second, the assessment measured immediate post-instruction performance only. The significant t test therefore reflects short-term learning outcomes rather than long-term retention or transfer of spatial knowledge. The durability of the observed effect remains uncertain.

Third, the effect size associated with the significant t test was modest. This indicates that while the difference between groups is statistically reliable, the magnitude of improvement was limited. This is expected in classroom-based educational research, particularly for short interventions, but it suggests that GIS should be viewed as a supportive instructional tool rather than a transformative solution.

Assignment occurred at the class level; with only two class-level units the assumption of independent observations is not met. As a result, inferential tests at the student level may be biased; results are descriptive and hypothesis-generating.

Finally, the study was conducted within a single school and focused on one geography unit. Factors such as teacher expertise, student familiarity with digital tools and availability of technological resources may have influenced the results and limit the generalisability of the findings.

5.2 CONCLUSION

The findings indicate that the GIS group obtained higher immediate post-test scores than the textbook-only group on the Location and Extent unit assessment (*mean difference* ≈ 2.0 marks; $t(138) = 2.21, p = .029$; *Cohen's* $d = 0.37$). This represents a small-moderate effect in favour of the GIS group.

However, these findings should be interpreted cautiously. The study employed a quasi-experimental, post-test-only design using two intact class sections selected by convenience. Random assignment at the individual-student level was not implemented, and no pretest was administered. Consequently, the results describe an association between GIS based instruction and higher immediate performance rather than definitive causal evidence.

Immediate post-testing minimised attrition-related data loss but assessed only short-term retention. The durability of learning gains and transfer to other contexts therefore cannot be determined from this study. In addition, the use of a single school and a limited sample restricts generalisability.

Future research should employ larger samples, cluster-aware randomisation or multilevel modelling, pretest–post-test designs, and delayed retention measures to more rigorously evaluate the causal impact and long-term effectiveness of GIS-based instruction.

5.3 RECOMMENDATIONS FOR FURTHER RESEARCH

In light of the statistically significant *t* test findings and the limitations of the study, these are the following recommendations:

1. Use of pretest–post-test designs: Future studies should incorporate pretests to more precisely attribute statistically significant differences to instructional interventions.
2. Examination of retention effects: Delayed post-tests should be included to determine whether statistically significant immediate gains persist over time.
3. Replication with larger and diverse samples: Replicating the study across different schools, grade levels and curricula would strengthen the external validity of statistically significant findings.
4. Analysis of effect sizes across units: Future research should compare effect sizes across different geography topics to identify where GIS produces the strongest statistically significant effects.
5. Investigation of moderating variables: Further studies should examine how teacher training, task design and student digital literacy influence the likelihood and magnitude of statistically significant outcomes.

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A STUDY OF OPERATIONS RESEARCH DURING WORLD WAR II AND ITS CONTEMPORARY RELEVANCE

Rinky Ahuja

Assistant Professor Seva Sadan College of Arts, Science and Commerce, Ulhasnagar, Mumbai, Maharashtra-421001

rinkyahuja@gmail.com

ABSTRACT

During World War II, physicists made significant contributions to the development and application of Operations Research, which played an important role in supporting Allied military operations. However, the specific nature and impact of these contributions are not always clearly understood. This paper examines how physicists applied Operations Research techniques to solve military problems and how these efforts shaped the evolution of the discipline. It further discusses the role of Operations Research in wartime decision-making and highlights its continued relevance in contemporary organizational decision making.

Key Words: *Operation Research, World War II, Military Decision Making, Quantitative Models, Management Science*

INTRODUCTION

World War II, which lasted from 1939 to 1945, was one of the most complex and devastating conflicts in human history, culminating in the victory of the Allied powers over the Axis forces. The Allies, including the United Kingdom, the United States, the Soviet Union, and other nations, faced enormous challenges in planning and executing military operations across multiple theatres of war. Traditional decision-making methods proved insufficient for addressing the immense logistical, strategic, and technological complexities of the conflict. To overcome these challenges, scientists and physicists were recruited to apply their expertise in mathematics, physics, and engineering, giving rise to the systematic application of Operations Research (OR). This discipline, though little known to the general public at the time, involved the use of quantitative analysis, modelling, and statistical techniques to optimize military decisions, improve efficiency, and reduce losses.

Several physicists made extraordinary contributions that directly aided the Allies. In the United Kingdom, Patrick Blackett applied Operations Research to optimize air defence strategies and the deployment of radar systems, significantly enhancing the ability to detect and intercept enemy aircraft and protect convoys from submarine attacks. Meanwhile, in the United States, Robert Oppenheimer led the Manhattan Project, overseeing the development of the atomic bomb, which provided the Allies with a decisive strategic advantage in the Pacific theatre. Other notable figures, such as John von Neumann, contributed mathematical expertise to military simulations and early computational methods that supported bombing strategies, while Enrico Fermi worked on nuclear physics for the atomic bomb. In addition, Alan Turing in Britain applied his mathematical brilliance to codebreaking at Bletchley Park, decrypting German Enigma communications, which proved invaluable to the Allied war effort. Collectively, these physicists and scientists applied analytical thinking, problem-solving, and innovation to areas as diverse as weapon development, logistics, radar technology, and strategic decision-making, demonstrating the critical role of science in wartime operations.

The contributions of these physicists were closely intertwined with the development and application of Operations Research. By systematically analysing complex operational problems, conducting simulations, and optimizing resource allocation, Operations Research became an essential tool for guiding decisions on the battlefield. It was used in tasks such as determining optimal convoy routes to avoid submarine attacks, planning bombing campaigns with minimal resource wastage, allocating anti-aircraft defences effectively, and evaluating the performance of new technologies such as radar and sonar. These methods demonstrated the power of combining scientific reasoning with practical problem-solving, laying the foundation for Operations Research as a discipline that extends far beyond military applications.

In contemporary times, Operations Research has evolved into a critical field in management science, logistics, healthcare, transportation, and business analytics. Although it is often known to students primarily as a subject within the curriculum, its real-world applications are far-reaching. Operations Research principles are used to optimize supply chains, schedule airline flights, improve hospital operations, manage inventories, and even in data-driven decision-making for government policies. For students, studying Operations Research is not merely an academic exercise; it equips them with analytical skills, problem-solving abilities, and quantitative reasoning that are highly valued in virtually every industry.

The techniques and frameworks developed in wartime continue to inform modern decision-making, demonstrating that the study of OR provides both historical insight and practical tools for addressing contemporary challenges.

LITERATURE REVIEW

Research on Operations Research during World War II has emphasized its role as a groundbreaking tool for military planning and decision-making. Scholars have highlighted the contributions of key physicists and mathematicians in developing systematic approaches to complex operational problems. Blackett's work on optimizing air defence and radar deployment has been recognized as pioneering, providing empirical evidence that quantitative methods could enhance military effectiveness. Studies of the Manhattan Project note the influence of Oppenheimer, Fermi, and von Neumann in applying mathematical modelling, simulations, and nuclear physics to critical strategic operations. Additionally, Turing's work on codebreaking demonstrated the application of computational methods to intelligence gathering, revealing the interdisciplinary nature of wartime Operations Research (Hodges, 2012).

Existing literature also explores how Operations Research was applied to specific operational challenges. Analyses of convoy routing, anti-submarine strategies, and bombing efficiency illustrate the use of statistical analysis, probability theory, and optimization techniques. Scholars argue that these applications laid the groundwork for post-war expansion of Operations Research into management science, logistics, healthcare, and organizational decision-making. Research further indicates that the collaborative efforts of scientists, engineers, and military planners created a methodological framework that has persisted in modern applications of Operations Research (Taha, 2017)

However, gaps in the literature remain. While major figures are well-documented, less attention has been paid to supporting scientists and the detailed methods they developed (Shapiro, 2019). Furthermore, contemporary studies suggest that OR's educational significance is often underemphasized; students may encounter it as a theoretical subject without full appreciation of its practical applications (Hillier & Lieberman, 2020). Addressing these gaps is essential to understanding the historical significance of OR and promoting its relevance in contemporary education and industry.

In summary, the literature establishes that Operations Research during World War II was both innovative and impactful, but more research is needed to recognize lesser-known contributors and to translate historical lessons into modern teaching and applications. This paper seeks to address these gaps by examining the contributions of physicists, the evolution of OR, and its contemporary relevance for students and professionals

RESEARCH METHODOLOGY

Objective of study

1. To find out the contributions of physicists to Operations Research during World War II
2. To examine the emergence of Operations Research during the Second World War
3. To study how Operations Research is applied in different areas of industry today
4. To examine the contemporary relevance of Operations Research

HYPOTHESIS

1. Physicists made significant contributions to Operations Research during World War II, which directly influenced the strategic success of the Allied forces.
2. The challenges of World War II led to the emergence and formalization of Operations Research as a systematic scientific discipline.
3. The methodologies developed in wartime Operations Research have evolved and are widely applied in contemporary industries such as logistics, healthcare, transportation, and management.
4. Understanding the historical and modern applications of Operations Research enhances students' analytical, problem-solving, and decision-making skills, demonstrating its contemporary relevance.

SOURCE OF DATA

This study relies entirely on secondary data, including books, journal articles, research papers, and credible online sources. No primary data were collected. The secondary sources provide historical details about physicists' contributions, Operations Research development, and contemporary applications across industries.

FINDINGS OF THE STUDY

The study shows that physicists made critical contributions to the Allied victory in World War II through the application of Operations Research. Their expertise helped optimize military strategies, improve intelligence, and strengthen defence systems. Technologies such as radar and cryptography provided essential intelligence and enhanced the effectiveness of air and naval operations. The development of the atomic bomb accelerated the end of the war in the Pacific. Problem-solving techniques and analytical methods developed during the war evolved into modern Operations Research applications. Contemporary industries using Operation Research include manufacturing, logistics, banking, and management, often under names like business analytics, decision science, and optimization models. Overall, physicists' contributions not only influenced wartime success but also established the contemporary relevance of Operations Research making it valuable for students and professionals today

LIMITATIONS OF THE STUDY

This study relies entirely on secondary sources, including books, journal articles, and credible online materials; no primary data or interviews were conducted. Therefore, interpretations depend on the accuracy and completeness of existing literature.

CONCLUSION

This study confirms that physicists made crucial contributions to Operations Research during World War II, directly influencing the strategic success of the Allied forces. It also shows that the challenges of wartime operations drove the emergence and formalization of OR as a systematic scientific discipline. The methodologies developed during this period have evolved into tools widely applied in modern industries, including logistics, healthcare, transportation, and management, demonstrating their enduring practical relevance.

Moreover, understanding both historical and contemporary applications of OR enhances analytical, problem-solving, and decision-making skills, highlighting its value for students and professionals. Overall, the research shows that the legacy of wartime Operations Research extends beyond history, continuing to shape modern decision-making and education.

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ROLE OF ARTIFICIAL INTELLIGENCE IN MOBILIZING THE START-UP ECOSYSTEM: AN EMPIRICAL STUDY OF MAHARASHTRA

¹Ritu Bothara and ²Dr.Amit Aggrawal¹Research Scholar, Sandip University, Nashik²Associate Professor, Sandip University Nashik**ABSTRACT**

Artificial Intelligence (AI) has emerged as a transformative technology reshaping entrepreneurial activity and innovation ecosystems across the globe. In India, Maharashtra represents one of the most dynamic start-up hubs, driven by strong institutional support, venture capital presence, and technological advancement. Despite the growing prominence of AI-driven start-ups, empirical evidence examining AI's role in mobilising the start-up ecosystem at the regional level remains limited.

The present study empirically investigates the role of Artificial Intelligence in mobilising the start-up ecosystem in Maharashtra. Using a mixed-method research design, primary data were collected from start-up founders and ecosystem stakeholders through structured questionnaires and interviews, supplemented by secondary data from industry and government sources. The study examines the impact of AI adoption on start-up growth, innovation capability, investment mobilization, and ecosystem support mechanisms. Statistical tools such as descriptive analysis, regression analysis, and factor analysis were employed to test the proposed hypotheses.

The findings reveal that AI adoption significantly enhances start-up performance, innovation outcomes, and investment attractiveness, while ecosystem enablers such as incubators, accelerators, skilled talent, and supportive policies play a moderating role in strengthening AI-driven entrepreneurship. However, challenges related to talent availability, high implementation costs, and data infrastructure persist. The study contributes to the entrepreneurship and innovation literature by providing region-specific empirical insights and offers policy recommendations to strengthen AI-led start-up ecosystem development in Maharashtra.

Keywords - Artificial Intelligence; Start-Up Ecosystem; Entrepreneurship; Innovation; Ecosystem Mobilization; Maharashtra.

INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed the nature of entrepreneurship and innovation across the world. Among these technologies, Artificial Intelligence (AI) has emerged as a general-purpose technology with the potential to reshape business models, enhance decision-making, and accelerate economic growth. AI-driven applications such as machine learning, predictive analytics, natural language processing, and automation are increasingly being integrated into start-up operations, enabling firms to improve efficiency, scalability, and competitiveness. As a result, AI is not only influencing individual firms but also playing a significant role in shaping and mobilising start-up ecosystems.

A start-up ecosystem comprises a complex network of entrepreneurs, investors, incubators, accelerators, academic institutions, government agencies, and support organisations that collectively facilitate entrepreneurial activity. The effective mobilisation of this ecosystem is crucial for fostering innovation, attracting investment, and sustaining long-term economic development. In recent years, technology-driven ecosystems have demonstrated greater resilience and growth potential, with AI acting as a catalyst for innovation-led entrepreneurship. However, the extent to which AI contributes to ecosystem mobilisation varies across regions depending on institutional support, talent availability, infrastructure, and policy frameworks.

In the Indian context, Maharashtra has emerged as one of the most prominent start-up hubs, supported by metropolitan centres such as Mumbai and Pune, a strong financial ecosystem, leading educational institutions, and proactive government initiatives. The state has witnessed a growing number of AI-enabled start-ups across sectors including fintech, healthtech, agritech, manufacturing, and logistics. Initiatives such as Startup India, the Maharashtra State Innovation Society, and state-level incubation and acceleration programmes have further strengthened the entrepreneurial landscape. Despite these developments, there is a lack of systematic empirical research examining how AI adoption influences the mobilisation and performance of the start-up ecosystem at the state level.

Existing studies on AI and entrepreneurship primarily focus on firm-level performance, technological innovation, or national-level policy frameworks. Limited attention has been given to understanding AI's ecosystem-level impact, particularly in regional contexts such as Maharashtra.

This gap restricts the ability of policymakers, investors, and ecosystem stakeholders to design targeted interventions that can effectively support AI-driven entrepreneurship.

Against this backdrop, the present study seeks to empirically examine the role of Artificial Intelligence in mobilising the start-up ecosystem in Maharashtra. By analysing the relationship between AI adoption, start-up performance, investment mobilisation, and ecosystem support mechanisms, the study aims to provide evidence-based insights into how AI can act as a catalyst for entrepreneurial ecosystem development. The findings of this study are expected to contribute to the literature on entrepreneurship and innovation while offering practical implications for policy formulation and ecosystem strengthening in Maharashtra.

What is startup-?

A startup is a new, often technology-focused company aiming for rapid growth by introducing an innovative product or service to fill a market need, characterized by high risk, scalability, and reliance on early-stage funding to disrupt existing models. While definitions vary, they generally involve innovation, potential for wealth/job creation, and often operate for a limited time (e.g., under 7-10 years) with defined turnover limits to qualify for government support.

AI IN MOBILIZING STARTUP ECOSYSTEM

Artificial intelligence (AI) is revolutionizing the startup ecosystem, offering innovative solutions that drive efficiency, scalability, and customer engagement. For startups, which often face resource constraints, AI provides tools to optimize operations and compete effectively in dynamic markets.

- 1. Enhanced Decision-** Making AI-powered analytics enable startups to gather and process large volumes of data quickly. By identifying patterns and predicting trends, startups can make informed business decisions, minimizing risks and maximizing opportunities. For example, AI algorithms can assess market demands, helping startups refine their product offerings.
- 2. Automating Operations-** AI automates repetitive tasks, saving time and reducing costs. Startups leverage AI-driven tools for customer service (Chabot's), inventory management, and marketing automation. This allows founders to focus on strategic growth rather than operational minutiae.
- 3. Personalized Customer Experiences-** AI enables startups to deliver tailored experiences by analyzing customer behavior. For instance, recommendation systems used in e-commerce startups enhance user satisfaction, driving higher sales. Personalization strengthens customer loyalty, which is vital for growth.
- 4. Innovation Across Industries-** Startups are pioneering AI applications in diverse sectors. In fintech, AI facilitates fraud detection and credit risk analysis. In healthcare, startups employ AI for diagnostics and personalized treatments. This cross-industry versatility makes AI an asset for innovation.
- 5. Access to Funding and Collaboration-** AI adoption signals innovation, attracting investors and partners. Startups with AI-driven models often secure funding more easily, given their potential for scalability and profitability.



Fig 1. The Role of AI in Business Growth

REVIEW OF LITERATURE

Sr. No.	Paper Name	Year	Author(s)	Methodology
1.	A Comprehensive Investigation of AI-Based Start-Ups in India	2022	A.R.Swami, V.S.Kumbhar, K.G. Kharade	Secondary data analysis; descriptive review of AI start-up trends, funding patterns, and technology adoption (ML, NLP, CV, DL) in India.
2.	Role of artificial intelligence in business transformation	2021	Dr.V.R. Palanivelu	Descriptive review of AI applications in business; secondary data on AI use in marketing, entrepreneurship, and business growth.
3.	The Role of Artificial Intelligence Technology and Innovation in Disrupting Traditional Business Models and Startup Ecosystem	2023		Conceptual/descriptive review of AI's impact on entrepreneurship, analyzing secondary data on AI-driven analytics, personalization, automation, and sectoral transformation.
4.	Startup ecosystem: an empirical study on issues and challenges	2020	Dr. Ankita Nagpal	Analytical and descriptive study examining secondary data on challenges faced by startups, their policy awareness, and entrepreneurial roles within the startup ecosystem.
5.	A wave of green start-ups in india—the study of green finance as a support system for sustainable entrepreneurship	2022	Mukul Bhatnagar, Sanjay Taneja, Ercan Ozen	Secondary data analysis using published reports and case studies to assess the status of green finance in India and its impact on green startups
6.	Enablers of success of AI-based start-ups in India	2024	Dr. Jaspreet Kaur	Literature-based analytical review summarizing secondary data, reports, and prior studies on AI adoption, economic impact, and technological transformation in India and globally.
7.	Impact of artificial intelligence on next-generation start-ups	2021	A. R. Swami	Descriptive review using secondary data to examine AI adoption in startups and SMEs, focusing on business processes, marketing, automation, and organizational transformation.
8.	A Study of Startup Ecosystem	2022	Rakshanda Dhanda	Descriptive analysis of secondary data on India's startup ecosystem, government policies, and initiatives under Startup India (2016 onwards).
9.	Role of New Technology and Atomization of Business Operations on efficiency of Startup Entrepreneurs in India: An Empirical study	2024	Dr. Anand Muley. Dr. Lalit Kumar Sharma	Survey-based study with 283 entrepreneurs across sectors; analyzed the impact of new technologies (AI, automation, cloud computing) and business process atomization on startup efficiency.
10.	Artificial intelligence, firm growth, and product innovation	2023	Tania Babina James Hodson	Empirical study using firm-level AI investment data derived from employee resumes; analyzed effects on sales, employment, market valuation, and innovation.

OBJECTIVE OF THE STUDY

1. To study the role of AI in spring up new business.
2. To identify the opportunities and challenges presented by AI for start-ups.
3. To evaluate the impact of AI on start-up performance and competitiveness.
4. To recommend strategies for start-up to leverage AI for more effective business.

HYPOTHESIS**Objective 1: To study the role of AI in springing up new business**

H1.1 (Alternative): AI adoption has a significant positive influence on the creation and emergence of new businesses.

H0.1 (Null): AI adoption has no significant influence on the creation and emergence of new businesses.

Objective 2: To identify the opportunities and challenges presented by AI for start-ups

H1.2a (Alternative – Opportunities): AI technologies create significant new business opportunities for start-ups in terms of innovation, market expansion, and operational efficiency.

H1.2b (Alternative – Challenges): AI adoption introduces significant challenges for start-ups, such as high implementation costs, technical complexity, and ethical risks

Objective 3: To evaluate the impact of AI on start-up performance and competitiveness

H1.3 (Alternative): AI adoption significantly improves start-up performance and enhances their competitiveness in the market.

H0.3 (Null): AI adoption does not significantly affect start-up performance or competitiveness.

Objective 4: To recommend strategies for start-ups to leverage AI for more effective business

H1.4 (Alternative): Strategic integration of AI significantly enhances start-up business effectiveness and operational outcomes.

H0.4 (Null): Strategic integration of AI does not significantly enhance start-up business effectiveness.

NEED AND SCOPE OF THE STUDY**Need of the Study**

1. The rapid adoption of Artificial Intelligence (AI) by start-ups has created a need to understand its impact on entrepreneurial growth and ecosystem development
2. Although Maharashtra is a major start-up hub in India, limited empirical research exists on how AI contributes to mobilizing its start-up ecosystem.
3. Most existing studies focus on conceptual or national-level analyses, creating a research gap at the state and regional level.
4. Understanding the role of AI can help start-up founders make informed decisions regarding technology adoption and business strategy.
5. Policymakers require empirical evidence to design effective AI-driven innovation policies and support mechanisms for start-ups.

Scope of the Study

1. The study focuses on start-ups operating within the state of Maharashtra.
2. It examines the role of Artificial Intelligence in mobilizing different elements of the start-up ecosystem.
3. The research covers AI applications in areas such as business operations, decision-making, marketing, customer service, and innovation.
4. The study includes perspectives of start-up founders, managers, and ecosystem stakeholders.
5. Both primary data (surveys/goggle form) and secondary data (reports, government publications, and databases) may be used.

6. The findings are specific to Maharashtra it include (Nashik, Pune, Mumbai, Nagpur, Chhatrapati Sambhaji Nagar) and may not be fully generalizable to other states or countries.

RESEARCH METHODOLOGY

Research Design:

The study uses a mixed-methods approach, combining qualitative and quantitative research to offer comprehensive insights.

Data Collection Methods:

Questionnaires: Conducted with business leaders and executives to gather primary data about AI adoption and its impact on start-up.

Structured questionnaires are distributed through:

1. Online survey tools
2. Email and professional networking platforms

Data Analysis Techniques:

Quantitative: Statistical analysis to measure the impact of AI adoption on start-up effectiveness.

Qualitative: Thematic analysis to identify patterns and insights from expert opinions and case studies.

Sampling

The target population for the survey includes start-ups in various industries, particularly those leveraging AI in product development, customer service, or operational efficiency. A snowball sampling technique will be used to select start-ups with significant AI adoption.

Snowball sampling is a non-probability sampling technique where existing study participants help identify and refer additional respondents from their professional or social networks.

The sample grows progressively, similar to a snowball rolling and increasing in size, making it suitable for hard-to-reach populations.

Target Population

1. Start-up founders and co-founders operating in Maharashtra.
2. Senior managers or technology heads of start-ups using Artificial Intelligence.
3. Entrepreneurs associated with incubators, accelerators, and innovation hubs in Maharashtra.

Sample Size

1. The study aims to collect responses from approximately 200–250 start-up respondents across Maharashtra.
2. The final sample size depends on:

Response rate

Availability of AI-enabled start-ups

Time constraints of the study.

CONCLUSION

This study aims to highlight the significant role AI plays in mobilizing and transforming the start-up ecosystem. AI is not just a technological tool but a strategic asset that enables start-ups to scale efficiently, innovate rapidly, and compete with established companies. However, challenges such as access to resources, expertise, and ethical concerns need to be addressed to fully leverage AI's potential. The findings from this study will help guide start-ups, investors, and policymakers in navigating the complexities of AI adoption and its application in the business landscape. AI empowers start-up to innovate, streamline processes, and create impactful solutions. Most start-ups are evaluating technologies across Artificial Intelligence, Machine Learning, Large Language Models (LLM), Generative AI, Deep Tech, IoT and Block chain to meet increasing customer requirements, improving customer experiences and bringing efficiency in operations. However, to address the ethical challenges and risks posed by AI, a responsible and sustainable approach with ethical practices and a robust legal mechanism is required. AI is undeniably transforming the Indian start-up landscape, offering unprecedented opportunities for innovation, efficiency, and growth. As AI technologies continue to evolve, start-up's that embrace and leverage Artificial intelligence will be well-positioned to succeed in an increasingly competitive and dynamic market.

By using AI to enhance decision-making, improve customer engagement, and boost operational efficiency, Indian start-ups can unlock new levels of success and contribute to the country's economic growth and technological advancement.

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**INNOVATIVE PATHWAYS IN COMMERCE AND MANAGEMENT EDUCATION:
DIGITALIZATION, RESEARCH, AND SUSTAINABILITY**

Riyu Rahul Haldankar

Assistant Professor, JVM's Mehta Degree College, Airoli

ABSTRACT

Commerce and management education is experiencing significant transformation due to digitalization, globalization, and growing emphasis on sustainability and ethical practices. Institutions are moving beyond traditional teaching methods and adopting innovative approaches that enhance flexibility, practical learning, and industry relevance. This paper examines how educational institutions are adapting through the integration of digital technologies, research-based learning, and industry collaborations.

The study highlights the use of digital learning platforms, virtual classrooms, and online assessment tools to improve accessibility, student engagement, and skill development. It also emphasizes experiential learning methods such as case studies, internships, simulations, and project-based learning that bridge theory and practice. Using case studies and visual data, the paper demonstrates the positive impact of innovation in teaching and research. The findings suggest that embracing digitalization and sustainability is essential for preparing commerce and management graduates to succeed in a rapidly evolving global business environment.

Keywords: Digital Transformation, Experiential Research, Sustainable Business, Moocs

INTRODUCTION

The traditional model of commerce and management education, which largely depends on classroom lectures and textbook-based learning, is increasingly inadequate in addressing the demands of today's fast-changing and technology-driven business environment. The rapid growth of artificial intelligence, big data analytics, automation, and global digital connectivity has significantly altered the way organizations operate and make decisions. As a result, educational institutions are compelled to rethink their teaching strategies, curriculum design, and research orientation to remain relevant and effective.

Contemporary research in commerce and management is gradually shifting from purely theoretical perspectives toward practical, application-oriented, and problem-solving approaches. Greater emphasis is being placed on industry partnerships, experiential learning, interdisciplinary research, and data-driven decision-making to address real-world business and societal challenges. This transition not only enhances academic relevance but also improves graduate employability and innovation capacity.

This paper explores the evolving landscape of commerce and management education with a focus on three key dimensions. First, it examines the role of digital tools and technologies in reshaping teaching, learning, and assessment practices. Second, it highlights emerging research directions that emphasize applied research, sustainability, and industry relevance. Finally, it analyzes the major challenges and opportunities faced by institutions in adopting innovative practices, including issues related to infrastructure, faculty readiness, and policy support. The study underscores the need for adaptive, future-oriented educational models to prepare learners for a rapidly evolving global business environment.

LITERATURE REVIEW

Recent studies highlight significant transformation in commerce and management education driven by digitalization, research integration, and sustainability. Digital technologies have reshaped teaching-learning processes by enabling blended learning, online platforms, and global academic collaborations. Scholars emphasize that digital education enhances accessibility and skill development, though challenges such as unequal access and the need for faculty training persist (Singh, 2021; OECD, 2022).

Research-oriented and experiential learning approaches have gained prominence in management education. Kolb (2014) stresses that experiential learning strengthens critical thinking and practical problem-solving skills, while Drucker (1999) advocates for inquiry-based education to address modern managerial challenges. Integrating research with real-world applications prepares students for dynamic business environments.

Sustainability has emerged as a core component of commerce and management curricula. Porter and Kramer (2011) argue that embedding social and environmental responsibility within business education fosters ethical leadership and long-term value creation. Global reports further reinforce the need for sustainability and future-ready skills in higher education (World Economic Forum, 2023; Altbach, 2015).

RESEARCH METHODOLOGY

This study adopts a qualitative research approach based on an in-depth analysis of secondary data sources. The data includes peer-reviewed academic journals, books, institutional reports, government publications, and industry white papers related to commerce and management education. These sources provide comprehensive insights into current trends, challenges, and innovations in digitalization, research practices, and sustainability.

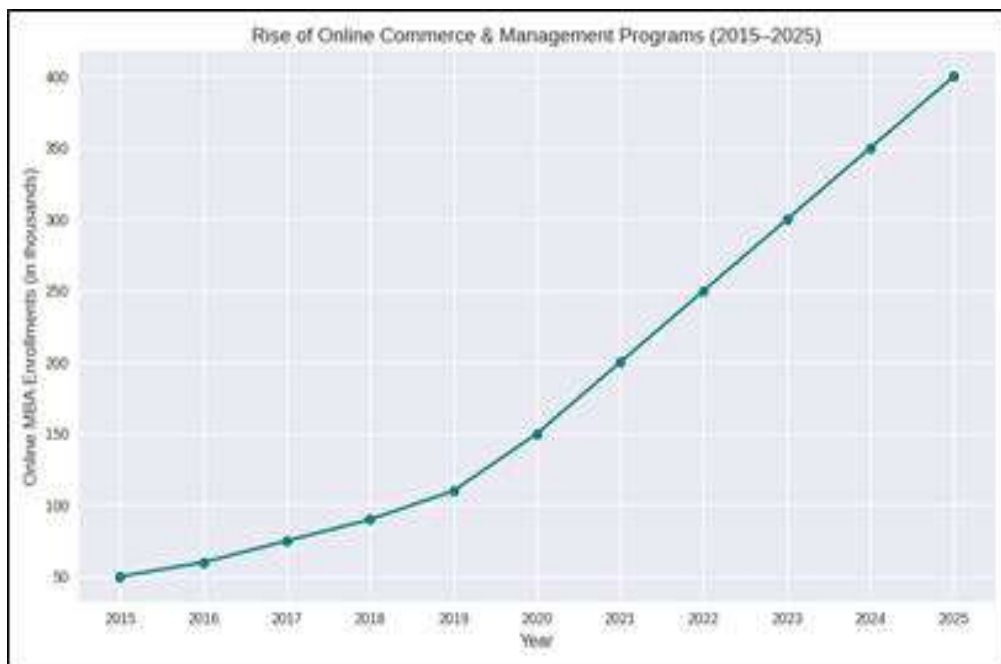
In addition, a comparative case study method is employed to examine best practices adopted by leading national and international institutions. The selected case studies focus on areas such as student enrollment patterns, growth in research output, adoption of digital learning platforms, and integration of technology-enabled teaching methods. Visual representations such as charts and figures are used to illustrate trends and patterns, enabling clearer interpretation and comparison of data.

The qualitative analysis allows for thematic interpretation of findings, helping to identify emerging models, strategic approaches, and institutional responses to changing educational and industry demands. This methodology provides a holistic understanding of how innovative practices are shaping commerce and management education and supports meaningful discussion on future directions and policy implications.

FINDINGS & DISCUSSION

1. Digital Transformation in Education

- **Case Study: Indian Institute of Management (IIM) Bangalore**



- **Chart 1: Rise of Online Commerce & Management Programs (2015–2025)**

The **Indian Institute of Management (IIM) Bangalore** adopted **hybrid learning platforms**, which combine traditional classroom teaching with online digital tools. This shift created a more flexible and engaging learning environment.

- **Flexibility for Students:** Learners could access lectures, discussions, and resources both in-person and online, making it easier to balance studies with internships or personal commitments.
- **Interactive Tools:** Use of digital platforms allowed for live polls, breakout sessions, and recorded lectures, which improved participation and understanding.
- **Higher Satisfaction:** Students appreciated the convenience and personalized pace of learning, leading to greater satisfaction.
- **Improved Outcomes:** Blended methods helped students grasp concepts better, collaborate more effectively, and perform well in assessments.

In short, IIM Bangalore's adoption of hybrid learning enhanced both the **student experience** and **academic performance**, showing how technology can strengthen higher education.

2. Research Innovations

- **Case Study: Harvard Business School**

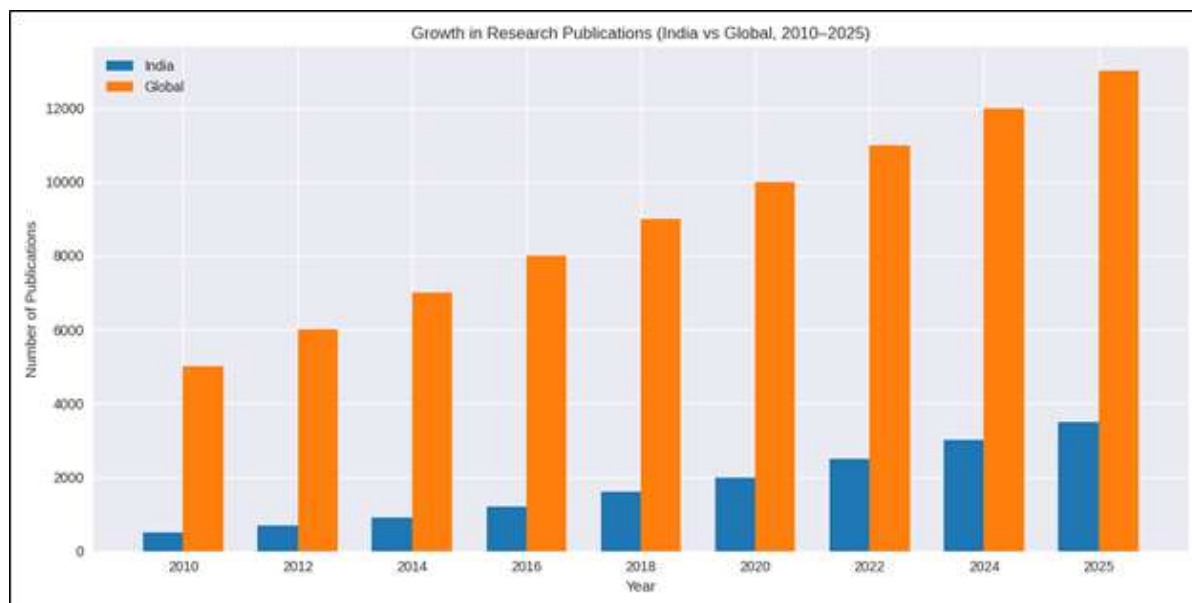


Chart 2: Growth in Research Publications (India vs Global, 2010–2025)

Harvard Business School (HBS) is well known for its **case study method**, which emphasizes real-world business scenarios. In the area of **market studies**, HBS has leveraged this approach to generate valuable insights for both students and industries.

- **Practical Learning:** Students analyze real market data, consumer behavior, and competitive strategies, making learning highly applied.
- **Industry Collaboration:** HBS often partners with companies to study emerging markets, trends, and customer preferences, ensuring relevance.
- **Decision-Making Skills:** By working through case studies, learners develop the ability to interpret market signals and make strategic choices.
- **Global Perspective:** Market studies at HBS frequently include international contexts, helping students understand diverse consumer bases and global competition.

In short, Harvard Business School's focus on market studies provides **deep insights into consumer trends and business strategies**, preparing students to tackle complex, dynamic markets effectively.

CHALLENGES

- **Unequal access to digital tools across regions:**
Significant disparities exist between urban and rural areas in terms of internet connectivity, availability of devices, and digital infrastructure, which limits equal learning opportunities for all students.
- **Resistance to change among faculty accustomed to traditional methods:**
Many educators are comfortable with conventional teaching practices and may hesitate to adopt technology-enabled or student-centric approaches due to lack of training, confidence, or institutional support.
- **Need for continuous professional development:**
Rapid technological advancements and evolving pedagogical practices require educators to regularly update their skills, which demands time, resources, and structured training programs.
- **Limited institutional funding and resources:**
Budget constraints often restrict the adoption of advanced technologies, learning management systems, and innovative teaching tools.
- **Digital literacy gaps among students and staff:**
Inadequate digital skills can reduce the effective use of e-learning platforms and online resources.

OPPORTUNITIES

- **Expansion of MOOCs and global collaborations:**

Massive Open Online Courses and international academic partnerships provide access to high-quality education, diverse perspectives, and global expertise.

- **Skill-based certifications aligned with industry needs:**

Short-term, industry-oriented certification programs enhance employability by equipping learners with practical and job-ready skills.

- **Greater focus on sustainability and ethical leadership:**

Integrating sustainability, social responsibility, and ethical values into curricula prepares students to become responsible global citizens and leaders.

- **Blended and flexible learning models:**

The combination of online and offline learning offers flexibility, improves learner engagement, and supports lifelong learning.

- **Use of data analytics and AI in education:**

Technology-driven insights can personalize learning, track student performance, and improve academic outcomes.

CONCLUSION

Commerce and management education is evolving at an unprecedented pace, driven by the forces of digitalization, globalization, and sustainability. Institutions that embrace digital transformation are able to provide students with access to advanced tools such as artificial intelligence, big data analytics, and cloud-based learning platforms, which not only enhance the learning experience but also prepare graduates for technology-driven workplaces. At the same time, experiential learning methods such as internships, live projects, and case-based teaching are becoming central to curricula, ensuring that students develop practical skills, critical thinking, and leadership abilities that go beyond theoretical knowledge.

Sustainability has also emerged as a vital pillar, with universities embedding corporate social responsibility and ethical business practices into their programs to cultivate socially conscious leaders who can balance profitability with environmental and social responsibility. Research in commerce and management is increasingly interdisciplinary and data-driven, integrating technology with real-world applications to generate insights that are both academically rigorous and practically relevant. By adopting these transformative approaches, institutions not only equip students for competitive careers but also contribute to national development, global competitiveness, and the creation of resilient, inclusive societies. This evolution underscores the role of education as a catalyst for innovation, entrepreneurship, and sustainable progress in the broader economic and social landscape.

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**PROTECTIVE CRIMINAL LAWS AND THE PRINCIPLE OF EQUALITY BEFORE LAW:
IMPLICATIONS FOR MALE ACCUSED**

Anwani Sadhna Kishore Renu

Assistant Professor at Seva Sadan College of Arts, Science and Commerce

Research Scholar at Shri Jagdishprasad Jhabarmal Tibrewala University

ABSTRACT

Protective criminal laws in India were introduced to safeguard women from violence and discrimination, aiming to address long-standing social inequalities and ensure access to justice. Although such laws are necessary to protect vulnerable individuals, their application has raised questions about the rights of male accused, particularly regarding procedural fairness, the presumption of innocence, and equality before law. This paper critically examines the impact of gender-specific protective criminal legislation on male accused, drawing upon secondary sources including statutes, judicial decisions, Law Commission reports, and scholarly literature. Key procedural concerns analyzed include mandatory arrest provisions, reverse burden of proof, and the social stigma male accused may face. By reviewing judicial interpretations and constitutional principles, the paper highlights the tension between protective intent and constitutional safeguards. It argues that while protective laws serve a vital role in addressing gender-based injustice, they must be applied in a manner consistent with the fundamental rights of all individuals. The study recommends procedural safeguards, gender-neutral drafting, and accountability mechanisms to ensure that criminal justice upholds both protection for victims and equality before law for the accused.

Keywords: *Protective criminal laws, Equality before law, Male accused, Due process, Gender neutrality*

1. INTRODUCTION

Criminal law in India plays a central role in regulating conduct and ensuring justice. In response to widespread gender-based violence and discrimination against women, the legislature has enacted several protective criminal laws to counter structural inequalities and provide robust mechanisms for victim protection (Menon, 2012). These laws include provisions in the Indian Penal Code (IPC) and related statutes that address domestic cruelty, rape, dowry deaths, sexual harassment, and cyber harassment, often with enhanced punishments and procedural advantages for complainants.

Although these provisions are essential to protect vulnerable groups, concerns have been raised about their potential impact on male accused persons. Features such as mandatory arrest provisions, presumptions in favor of the complainant, and the absence of preliminary inquiry have drawn criticism for potentially undermining the presumption of innocence and other procedural safeguards enshrined under the Constitution of India (Constitution of India, 1950). This paper critically explores these issues, examining whether the application of protective criminal laws aligns with the constitutional guarantee of equality before law (Article 14) and the right to personal liberty (Article 21).

2. LITERATURE REVIEW

The literature on protective criminal laws in India reveals a dual narrative. On one hand, feminist legal scholars and commentators argue that gender-specific legislation is necessary to mitigate the effects of patriarchy, prevent violence, and facilitate reporting by victims who might otherwise remain silent due to social stigma (Menon, 2012; Singh, 2019). Such advocacy underlines the structural barriers faced by women in accessing justice and emphasizes the protective function of criminal law.

On the other hand, legal analyses and Law Commission reports have identified instances where such protective provisions may be misused, particularly in cases involving matrimonial disputes and allegations of cruelty (Law Commission of India, 2015). These studies highlight the absence of adequate procedural safeguards as a point of concern, suggesting that misuse can erode public confidence in the criminal justice system.

Despite these insights, there remains a gap in detailed analysis regarding the constitutional implications of protective criminal laws on male accused persons. Most research focuses on either the necessity of protection or the general potential for misuse, without systematically situating the debate within the framework of equality before law and due process. This paper seeks to address that gap.

3. RESEARCH METHODOLOGY

This research adopts a **doctrinal methodology**, relying entirely on **secondary sources** to analyze the legal and constitutional issues surrounding protective criminal laws in India. The methodology includes:

1. **Statutory Analysis:** Examination of relevant provisions in the Indian Penal Code (IPC), Criminal Procedure Code (CrPC), and other related statutes.
2. **Judicial Review:** Analysis of key judicial pronouncements by the Supreme Court and High Courts addressing the enforcement, safeguards, and potential misuse of protective criminal laws (Arnesh Kumar v. State of Bihar, 2014; Rajesh Sharma v. State of UP, 2017).
3. **Literature Review:** Critical examination of scholarly articles, books, and Law Commission reports.

This qualitative approach enables an evaluation of doctrinal positions, constitutional principles, and judicial reasoning without the use of primary data.

4. LEGAL FRAMEWORK OF PROTECTIVE CRIMINAL LAWS

Protective criminal laws in India are designed to address violence and discrimination against women. Key statutory provisions include:

- **Section 498A IPC (Cruelty by Husband or Relatives):** Creates a cognizable and non-bailable offence for cruelty, often involving domestic disputes and dowry harassment (Law Commission of India, 2015).
- **Sections 375–376 IPC (Sexual Offences):** Define and penalize rape and related sexual offences, with specific procedural safeguards for complainants (Menon, 2012).
- **Section 304B IPC (Dowry Deaths):** Establishes presumptions of guilt regarding dowry deaths under certain circumstances (Singh, 2019).
- **Sections 354, 354A–354E IPC:** Address sexual harassment, stalking, and cyber harassment against women.

These provisions often include legal presumptions favoring victims, mandatory arrest protocols, and provisions for enhanced punishment. While such measures are aimed at ensuring effective protection, critics argue that they may also result in procedural imbalances when applied without adequate safeguards.

5. IMPACT ON MALE ACCUSED

5.1 Presumption of Guilt

Certain provisions, particularly where the burden of proof is shifted or reversed, can undermine the principle of presumption of innocence. For instance, in dowry death cases under Section 304B IPC, courts may presume certain facts once foundational evidence is presented, affecting the evidentiary balance between prosecution and defence (Singh, 2019).

5.2 Arbitrary Arrest

Mandatory or routine arrest in cases under Section 498A IPC has been criticized for bypassing preliminary inquiry, leading to arrest before the merits of the complaint are assessed (Arnesh Kumar v. State of Bihar, 2014). Such arrests can have significant personal and social consequences for male accused persons and their families.

5.3 Social and Psychological Consequences

Male accused persons often suffer reputational harm, loss of employment, estrangement from family, and emotional distress due to the stigma associated with criminal accusations. Even after acquittal, the social impact can remain long after the legal process ends (Singh, 2019).

5.4 Limited Remedies for False Complaints

Currently, remedies for malicious or false complaints are limited and rarely enforced. This lack of accountability can inadvertently encourage misuse, undermining public confidence in protective criminal legislation (Law Commission of India, 2015).

6. JUDICIAL ANALYSIS

Indian courts have actively engaged with concerns related to protective criminal laws and procedural safeguards:

- **Sushil Kumar Sharma v. Union of India (2005):** The Supreme Court observed instances of misuse of Section 498A and emphasized the need for safeguards, including preliminary inquiry, before arrest.
- **Arnesh Kumar v. State of Bihar (2014):** The Court held that arrest under Section 498A should not be automatic and must involve judicial or executive discretion, highlighting the need to balance arrest powers with fundamental rights.

- **Rajesh Sharma v. State of UP (2017):** The Supreme Court reiterated the importance of protecting personal liberty and cautioned against indiscriminate arrests in gender-specific offences.

These decisions reflect judicial recognition that while protective laws are necessary, their application must be balanced with constitutional protections guaranteed under Articles 14 and 21 of the Constitution of India.

7. MISUSE VS PROTECTION: CONSTITUTIONAL TENSION

Protective criminal laws are indispensable for combating violence and discrimination against women, but their enforcement must align with constitutional principles. **Article 14** ensures equality before the law, while **Article 21** guarantees the right to life and personal liberty (Constitution of India, 1950). Misuse of protective laws can infringe these rights, particularly when procedural safeguards are not scrupulously observed.

Achieving substantive equality requires a framework where protective laws function effectively without creating procedural disadvantages based on gender. Legal provisions that inadvertently undermine neutrality or fairness must be re-examined in light of constitutional mandates.

8. FINDINGS

1. Protective criminal laws serve an essential role in addressing gender-based violence and structural inequality.
2. Procedural features such as reverse burden of proof and mandatory arrest can adversely affect male accused, potentially infringing constitutional rights.
3. Judicial safeguards exist but require consistent and sensitive application.
4. Lack of accountability mechanisms for false complaints can undermine the legitimacy of protective legislation.
5. Gender-neutral drafting and procedural checks are necessary to uphold equality before law and due process.

9. SUGGESTIONS

1. **Preliminary Inquiry:** Introduce mandatory preliminary inquiry before arrest in gender-specific cases to prevent arbitrary detention.
2. **Gender-Neutral Drafting:** Amend legislation to ensure gender neutrality, recognizing that male victims may also require protection.
3. **Accountability Mechanisms:** Strengthen legal remedies for false and malicious complaints to deter misuse.
4. **Training and Sensitization:** Provide balanced training for police and judiciary to ensure enforcement that respects procedural fairness.
5. **Judicial Oversight:** Encourage judicial scrutiny of arrests and procedural steps to uphold constitutional guarantees.

10. CONCLUSION

Protective criminal laws are fundamental to preventing gender-based violence and ensuring victim protection. However, their implementation must be aligned with the constitutional principles of equality before law and due process. Male accused persons may face procedural disadvantages under certain protective provisions, highlighting the need for judicial oversight, gender-neutral drafting, and balanced enforcement. A criminal justice framework that equally protects victims and respects the rights of the accused strengthens both justice and public trust in the legal system.

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A STUDY ON FINANCIAL MARKET AND FINANCIAL SERVICES IN INDIA

Sanjana Bholaram Saroj

Assistant professor, Seva Sadan College of Arts, Science & Commerce

ABSTRACT

This Study Financial Market and Financial services it is very important key to improve the economic growth in India. The objective of this study is to create Awareness Among the people and Pursue them to Invest and Utilize the Financial services Which is Available in India. The Main Aim of Research is to Spread the Fact of Financial Market and it's types and Benefits of Financial Market and also provides the information about Financial services like Banking, Insurance, Wealth Management, Mutual Funds etc. And to create a Transparency and protect from fraudulent practices . This study helps to investors, customers, Society, and People of India to provide Transparent look of Financial market and encourage them to do Investment and take the Benefits of Financial Services and Connect with them the concept of Net Banking, Paytm, BHIM-UPI Payments services and with the AI Techniques Utilization & Connect with them to Regulating Authorities like SEBI, RBI, IRDAI of Financial services and Financial market of India.

Keyword: *Financial market, Types of Financial Market Financial services, Types of Financial Services Investment, Financial literacy, Securities Exchange Board of India (SEBI), Reserve Bank of India (RBI), Artificial Intelligence.*

INTRODUCTION

Financial Market it is place where people, institutions, retailer, Customers, investors, employees, individuals can buy and Sell the Financial assets like Shares, Bonds, currencies, securities and commodities. It Helps to Build More Capital with Risk taking Capacity .It Helps to Grow your savings, grow your funds from investment and it supports the economic growth. .Stock Exchange, Banks, Regulatory bodies like SEBI, RBI these are the important institutions who is playing an important role in Financial market of India. Reserve Bank Of India (RBI) controls and regulate banking & Monetary System. It helps to issue and manage currency, and money supply and supervise the commercial bank and securities exchange board of India (SEBI) it is regulatory authority of capital market in India . It protect investor's interest and regulate stock exchange it ensure fair and transparent trading and protect from fraud and malpractices in securities market. SEBI regulate stock market and securities.

Financial services is that activities which help to manage Money , provide credit Facility, Help in investment, Reduce the risk and enabling a smooth functioning of financial system. The Indian financial services sector includes Banking, Insurance, capital market, mutual fund and financial technology etc. Due to digitalization financial services in India have become more transparent, accessible and technology driven. Reserve Bank of India (RBI) , securities and exchange Board of India (SEBI), insurance Regulatory Development Authority of India (IRDAI) Ensure stability and protect consumer interest. Overall financial services and financial market are the backbone of India.

REVIEW OF LITERATURE

(Adam, january 2009) on his study of financial market he states that financial sector is important to boost the economic and helps those who wants to invest, and he clearly states the fact of rapid change in financial market.

(Nuhui, october 2011) on his study states that economic development and capital market are connected with each other . Proper functioning of capital market and impact of capital market will lead to economic development.

(chakrabarti, july 2018) on his study he clearly states that indian financial market still away from monetary policy. He clearly said they have to spread the awareness regarding stock market & connect the public to financial services as well.

(Nair, september 2021) on her study Indian financial market include Indian financial institutions like Bank, mutual fund , Different markets & it's playing important role for Indian economy she clearly states also after digitalization happen financial sectors is booming investor also get the benefit from digitalization it made investing simple, Quick and Easy.

(Parghi, september 2021) They states that Financial services are important components of financial system of India it is backbone of economy they assist alleviate situation so financial service continue with less negative

consequences which can help to increase the customer service and help to have low income loss for financial institutions.

RESEARCH METHODOLOGY

This research On the concept of financial management use Primary and Secondary Data . To get Quantitative data primary Data Survey Conducted and Questionnaire has passed and Collect the information from public and To get the Qualitative data Through Various Literatures and Previous articles, Journals Books are used.& Secondary Data is Collected. The Data collected and analyze Using Descriptive Quality Approach with the steps of Data reduction, data display, verification and conclusion. On this research Probability Sampling methods is used for sampling techniques because Probability sampling techniques give accurate & Reliable Data. In this research Study Simple Random Sampling & Snowball sampling Techniques are used.

Meaning & Types of Financial Market: Financial market Means a place where buyer and seller trade or buy and sell the different kind of the security & Financial instrument like shares, Bonds, currencies and derivative, treasury bills, commercial paper etc.

DIFFERENT TYPES OF FINANCIAL MARKET

1. Stock market: It is also known as equity market. The stock market is place where shares of companies are bought and sold, and allow the companies to raise money through IPO . It is used by companies to raise capital and by investor to search for Returns. Stocks may traded on listed exchanges like New York Stock Exchange (NYSE) , NASDAQ and many more . NSE And BSE is India's Most oldest Exchange where trading Happen. NSE India largest electronic stock exchange where different kind of security, share, derivative are traded and NIFTY 50 it's main index, and BSE is Asia's Oldest stock exchange it's main index is Sensex which track the performance of 30 Main leading companies.

2. Over the counter market: It is Decentralized market one without physical location where trading is conducted electronically in which market participant trade securities directly. It facilitates trading of smaller or riskier companies that do not meet the listing criteria of public exchange, most stock trading is done Via public exchange.

3. Bond market: The bond market is Financial market where bonds /debt securities are issue. Bond can be thought of as an agreement between lender and borrower, but the lender is the investor. Bonds are issued by corporations as well as by States, sovereign government to finance project and operations. In simple companies, institutions borrow money from investors and promise to pay regular interest and repay principal amount after a particular fixed period. Like bond market sells securities such as notes and treasury bill issued by United States treasure. This market is also called fixed income market.

4. Money market: the money market is place where short term money which is less than one year is borrowed and lent . It is very helpful for those who need money like Banks, Companies, government manage short term cash needs. Individual can also invest in money market by purchasing short term certificate of deposit (CD), Municipal notes,U.S treasury bills, among others.

5. Derivative market: It is contract between two or more parties whose value is based on agreed upon underlying financial asset. The derivative market is Financial market where contract are traded whose value is depend on another asset like share,Bonds,commodities,or currencies. For example share price goes up or down derivative value also changes. Derivative market trades in future and option contract & other advance financial product that derive their value from underlying instrument like bond, commodity, currencies, etc.

6. Forex market: it is marketplace where participant can buy, sell, hedge and speculate on exchange rate between currency pair. The forex market is the most liquid of asset. In simple words forex marker is where currencies of different countries are bought and sold.

7. Commodity market: it is a venue where producer and consumer meet to exchange physical commodities such as agricultural products (corn, livestock, soybean,) and energy product and precious metal like oil, gas golf, silver and soft commodities like cotton, coffee and sugar. MCX and NCDEX it is place where deal done. On MCX(Multi Commodity Exchange) where Gold, silver, crude oil, natural gas trading happens. And in NCDEX(National commodity and derivative exchange) where agriculture products like wheat, Chana, soybean, cotton trading has placed.

8. Cryptocurrency market: the Cryptocurrency market is a digital market where Digital currency trading placed with using block chain trading like Bitcoin, Ethereum and Ripple. In India it is regulated partially under RBI and IT laws. It is growing as a digital investment and trading option.

FINANCIAL SERVICES IN INDIA

1. Banking: The banking industry is the backbone of India's financial service industry. The country has several public sector, private sector and urban/ rural cooperative banks. The financial service offered in this segment include a. Individual banking(checking account, saving account, debit/ credit card) b. Business banking(merchant services, checking accounts and saving account for business, treasury Bills) C. Loans(business loan, personal loan, home loan, automobile loan etc.) in simple banking in India is a key Financial service that helps people and business or firm to save money, make payment and borrowed fund and managed the finance. RBI is regulated this system and make ensure safety, protect from fraudulent practices, spam transaction.

2. Mutual fund: it is service providers offer professional investment service across fund that composed different asset class. In simple mutual fund in India is that Financial services where investors can invest in different securities in just one Basket Managed by professional fund Manager. These products are very popular in India as they generally have lower risk, tax benefits, stable returns and properties of diversification. Over the last five year owing to it's popularity as a low risk wealth multiplier. It is regulated by SEBI helping individual to grow there wealth and manage the risk.

3. Insurance: financial services offering in this segment are primarily offers across two categories:

- General insurance: (Automotive Home, Medical, Fire, travel, accident, etc.)
- Life insurance: (term- life, Money Back, unit linked, pension plan, etc.)

It safeguard against unforeseen circumstances and accidents, insurance in India is that financial services that protect from financial terms against the risk life, Health, Accident and property loss and it helps individual and business to secure there future. It is regulate by IRDAI.

4. Stock market: it is segment includes investment solutions for customers in indian stock market (National stock exchange and Bombay Stock exchange) across various equity linked products. In simple the stock market in India is financial services that enable buy and sell of shares and securities and helping companies to raise capital and investors to earns high returns and stock market is regulated by SEBI.

5. Digital Payment services: Digital payment service in India it is electronic method of transferring money without using cash. Or Digital payment service in India are Financial services which enable a cashless transaction through UPI(Google pay, Paytm, phonepe, debit and credit card, mobile wallets, internet banking, and QR code payments. It make the transaction fast, convenient, low cost and secure for individuals as well as business. It help to less depends on cash, increase transparency and helps to build economic growth. It is regulated by RBI & support by NPCI platforms.

6. Other: other financial services like tax/ Audit consulting, portfolio management, professional advisory wealth management, pension and retirement service, foreign exchange services.

RECENT TRENDS IN FINANCIAL SERVICE AND FINANCIAL MARKET IN INDIA

1. Government Budget and Market sentiment (union budget 2026 has impact on market such as increase in borrowing and revised tax policies.)
2. Increase in commercial credit flow: (commercial sector credit flow is increase which indicates healthy capital allocation regarding investment and expansion.)
3. Equity & IPO Growth: Indian capital market expand in size with record of equity market capitalization and increase IPO Activity)
4. Retail Investors participation: (Rising Number of Demat account and mutual fund investors.)
5. Rapid Digital Transformation: (India's financial service are increasingly digital with using platform like AI, Machine learning and data analytics.)
6. Growth of Digital payments (Digital payments like UPI expand rapidly, driving a cashless economy, QR payments.)
7. Rise of Neobanking and Open Finance (Digital only banks/Neo banks and open banking, these platforms offer seamless branchless financial service and control over personal finance)
8. Ai and automation in service (AI increasingly used in customer engagement like Chatbot, risk protection, quick decision)

ARTIFICIAL INTELLIGENCE (AI) IN FINANCIAL MARKET AND FINANCIAL SERVICE

- Artificial Intelligence in Financial Market:** Ai in Financial market Boost the Economic Activity and Helps to Do Safe Trading, Investing. Due to Artificial Intelligence (AI) It Becomes very Helpful to Investor to Keep Eye On Portfolio And Protect From Fraudulent Practices. It Helps to Track the Portfolios, Shares, Mutual fund etc. AI Provide Chatbot Services Where investor Can keep Eye on best shares and identify the risk level and opportunity to Boost Fund

Benefits of AI in Financial Market:

- High Frequency Trading
- Shows real time Data like Price, volume, News
- Helps in Market Prediction and Forecast
- Reduce the risk & Fraud

2. Artificial Intelligence In Financial Service:

AI not only helps in Financial market it is also beneficial in Financial services. In India there are many users who are using the AI Technology in Financial Services sectors. It can be Banking, Insurance, Net Banking- BHIM UPI etc. AI give many services to it's customer in the form of Credit scoring ,Virtual assistant.

BENEFITS OF AI IN FINANCIAL SERVICES

- Banking (Chatbot Facility, 24/7 Provide Virtual Assistance, Balance check, Complaint, Credit scoring through Using transaction Data, GST Data, and personalized Banking)
- Insurance (Helps in Claim settlement, protect fraud in time of claims, provide image recognition features in types of vehicle & Health insurance Claims, Track on your maturity period)
- Payment & Fintech : (Helps in Real time Fraud identify in UPI payments, card and wallets, improve transaction protection security)
- Wealth Management: (It provides Robo- Advisory, and provide Low cost, Minimum Cost investment advice, Track Risk, Helpful for Mutual fund and Digital Brokers.)

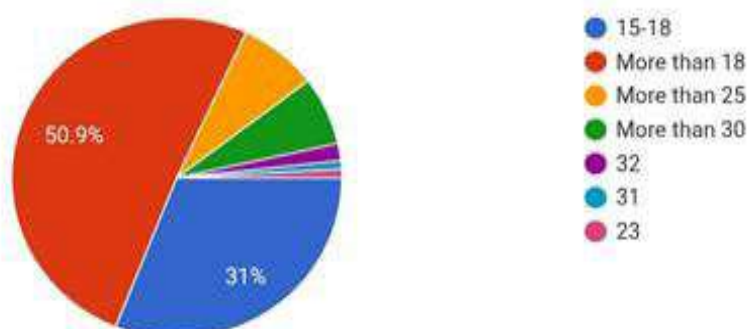
ARTIFICIAL INTELLIGENCE IN INDIAN FINANCIAL SYSTEM

- Reserve Bank of India (RBI) & Securities Exchange Board Of India (SEBI) :RBI and SEBI Both use AI for Supervision and Regulatory Compliance and Track the performance Of All listed company which is listed in NSE & BSE and take the Necessary Action for fraudulent Practices .
- Banking System of India: AI Helps the all Banking sector by providing credit facility information, Fraudulent information message, transaction message and provide Chabot and 24/7 Customer service. For Example SBI, HDFC, ICICI
- Fintech service: Fintech services mostly rely on AI tools and technique . For example Paytm, Zerodha, Angel one, phonepe this company are using heavy AI tools on there services.

Data Analysis & Interpretation: Total 116 sample size respondents are collected By Passing Questionnaire.

Age

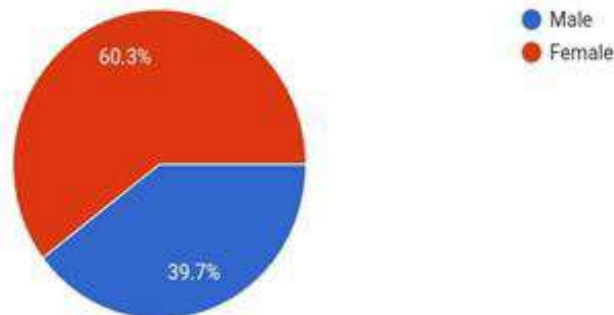
116 responses



Data interpretation: According to Survey conducted In India the different age group are invested in Financial market. Age group more than 18 is 50.9% Young people are taking more interested in the Financial market.

Gender

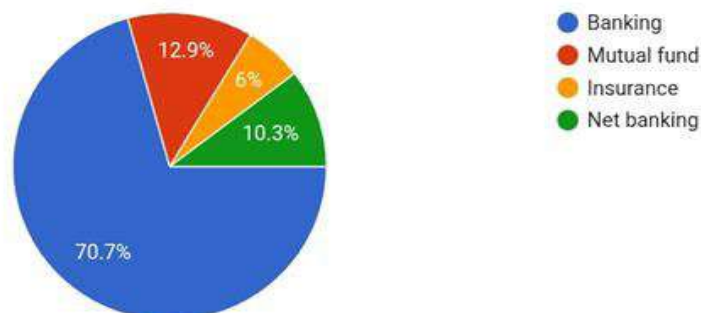
116 responses



Data interpretation: From the Survey conducted in India . We analyses there is not only males are interested in Financial market females are also actively participate to do invest in different- different Financial market and financial services. From the below chart diagram it show in India there is 60.3% females and 39.7% makes are actively investing in Financial markets. It represent that there is increase in the numbers of women in interested in Financial market.

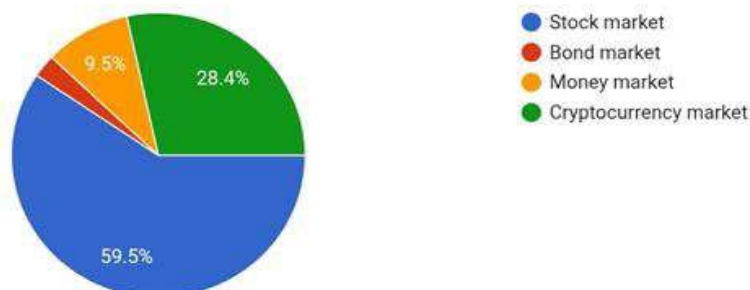
Which financial services you are using

116 responses



Which financial market is risky?

116 responses

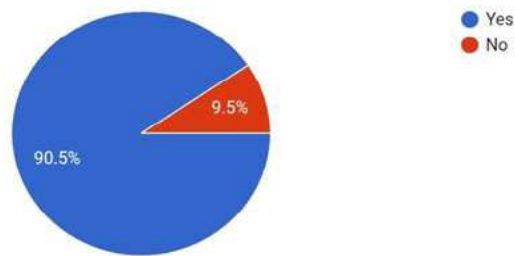


Data interpretation: From the above survey it show that in India 70.7%people are using Banking service and 12.9% people are using mutual fund service & in insurance 6% and net banking 10.3% people are taking Financial services.

Data interpretation: According to survey 59.5% people believe stock market is higher riskier and 28.4%people are believe Cryptocurrency is also high risk Financial market .

Have you aware about financial market

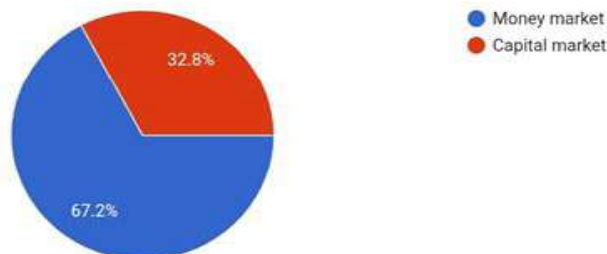
116 responses



Data interpretation: From the survey we got to know that 90.5% people are aware about what is the financial market, which sector is best for invest and which Financial market is riskier only 9.5% people are not aware about Financial market due to lack of knowledge or not providing correct information in India.

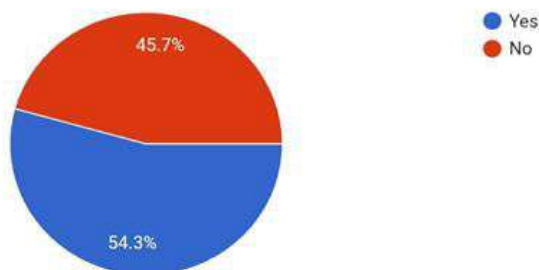
Which financial market would you prefer?

116 responses



Do you invest in financial market instrument such as shares or debentures

116 responses

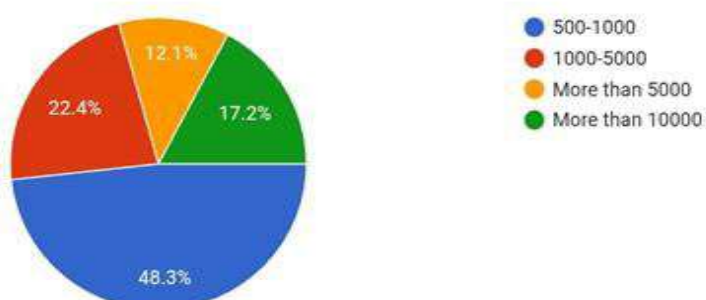


Data Interpretation: According to survey In India people are Investing more in money market as compared to capital market. From the above survey 67.2% people are interested in investing in financial market & rest 33.8% people are referring capital market invest.

Data interpretation: From above survey it clearly states that indian people are Nowadays are taking interested to invest and grow there fund. From the given pie diagram it clearly states that 54.3% people are investing in share and rest 45.7% people are investing in other instrument like Debenture, Bonds.

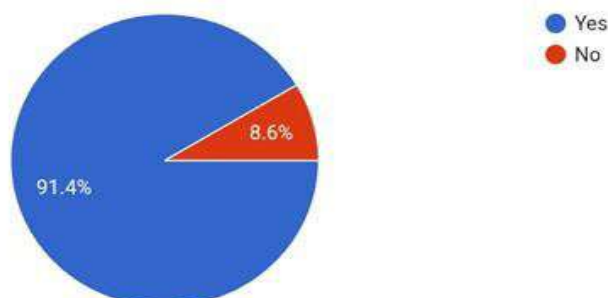
How much amount you invest?

116 responses



Do you think AI in Financial market and Financial services will help you?

116 responses



Data interpretation: As per survey Indian people are showing they can start invest with the amount range of 500-1000. It clearly states that 48.3% people are ready to invest between range of 500-1000. And 17.2% people can do more than 10000 invest as per there earning capacity.

Data interpretation: According to survey we got 91.4% people find AI is very helpful for Investing and on Financial market.

Do you believe Indian financial markets will grow in future

116 responses



Data interpretation: According to survey 98.3% people are believing Indian Financial market will grow in future . Major of public will start investing in all sector , public believe it will AI will lead the investment opportunities.

FINDINGS

1. This research find that technological advancement and Financial innovations have expanded investor participation and promoted to invest in different- different sectors.
2. This study finds that due to increasing in global integration of Financial market facilitate Indian people to cross border capital flow and hence increase global financial Volatility.
3. This study finds that Financial services play important role to support or grow Economic Development by facilitate Saving, Investment, Payments sectors.
4. This study also Finds that Banking services is Backbone of Financial services Sectors. 70.7% people are still using Banking services in India.
5. This findings indicate Customer services, Trust, technological Adoption this thing influence customer and investor satisfaction.

SUGGESTION

1. There is still Need to improve Financial Literacy Program to improve the awareness, and explain the proper risk level, promote decision making among retail investor In India.
2. There is still in India people are choosing less risky security or want to invest in money market there is need to give In detail Capital market .
3. There is need to RBI, SEBI, IRDAI to make more and more strong Regulatory Framework Authority and increase the transparency .

4. There is Need to Make Grievance Redressal System Against the Malpractice to Build Trust in Indian Financial Market.
5. Financial services providers Like bank, insurance has to make Digital platforms to rural side area to simplified account opening procedures.
6. Bank should Focus on Services Quality, Fast credits Delivery and need to improve customer relationship management and have to make strong restrictions regarding fraudulent practices.
7. Digital Banking and payment service should be improve fast and make alert whenever there is fraud transaction or sms passed to customer.

CONCLUSION

Financial market and financial services is very important playing role in India. It helps in Saving, increase in capital and support to investment into different sectors. At the same time Financial services like Banking, insurance, Mutual fund, Digital payment system provide Support to individual, Business and government. Due to increase in Technology like AI, Digital Banking, UPI payment it strengthen the Financial services of India. And we found in India people are using Banking service is most they also using Investment opportunity . Many investor are investing in money market but it seems like there are some emerging investors who is start to take risk and invest in capital market as well especially Youngsters. And we found the literacy rate in financial market is increasing.

Overall well regulated transparent Financial market & Financial services is essential for India's sustainable economic growth. Continuous reform, investors education & technological innovation will lead to further strengthen Indian Financial market in future.

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ROLE OF DIGITALIZATION IN INDUSTRIAL TRAINING INSTITUTIONS

¹Mrs.Sapana Kumbhar and ²Dr. Ratna Nimbalkar¹Assistant Teacher, Research Scholar- SICES Jr. College, Ambarnath (W)²Research Guide-K.M.Agrawal College, Kalyan (W)¹sapana1974.sk@gmail.com and ²Ecodept.94@gmail.com**ABSTRACT**

Digitalisation has transformed the landscape of Industrial Training Institutions (ITIs) in India, enhancing the skills and efficiency of students and improving their employability prospects. This research paper examines the impact of digital technology on ITIs, focusing on the adoption of digital tools, their effectiveness, and the challenges faced by students and teachers. A mixed-methods approach was employed, combining primary data from 82 students in Ulhasnagar and Shahpur ITIs, Mumbai, with secondary data from relevant sources. The findings reveal that digitalisation has led to interactive teaching-learning processes, improved administrative efficiency, and enhanced marketable skills, ultimately boosting employability. However, challenges persist, including inadequate digital infrastructure, insufficient training, and internet connectivity issues. The paper concludes with recommendations for addressing these challenges, including providing comprehensive training for teachers and ensuring uninterrupted internet connectivity, to harness the full potential of digitalisation in ITIs.

Keywords: Digital Technology, ITI's (Industrial Training institutions), Skill development.

1.1 INTRODUCTION

Vocational training and education provides a wide area and methodology that empower learners with practical skills and knowledge required for specific industries and professions. Vocational training is crucial to meet the needs of an everchanging job market. Digitalization acts as a powerful catalyst for transforming Industrial Training Institutions into a powerful and effective entity. Digital Technology is an input, it is a means of delivery, it is a skill and planning tool. (The Global Monitoring Report 2023) Digitalization is spreading across all spheres of our life. Digitalisation improves efficiency and accessibility, modernises training through an online platform, virtual reality and simulations. This helps to enhance the skill of trainees and make them market ready. Digitalisation means using digital technologies like the use of computers and the internet to change how business or process works. (Google) Digitalization transform large labour force into adaptable, flexible and analytical skilled workforce who is responsive to the changing global needs and environment (Kumar & Kaur 2022)

1.2 ITI (INDUSTRIAL TRAINING INSTITUTION) AND DIGITALISATION

To improve availability and efficiency vocational education started using different digital tools such as online platform and virtual reality for simulation training. A world market continues to expand and develop in order to meet changing economic conditions and employment demands. (Global Trends in vocational training education – A bibliometric analysis) Government of India has begun various programmes to strengthen India and make it a knowledge-intensive economy. To accelerate digital access, promote digital investment and increase employment opportunities while cultivating digital empowerment to develop investment, employment opportunities and digital technological capabilities in India. (Ministry of Electronics and IT 2021).

Industrial training institutes is an oldest training institutes which gives skill training in various job-oriented course and make the youth future ready. ITI's are the institutions giving training in vocational education therefore, play an important role in industry and economic development of the country. Ensuring widespread exposure to technical and vocational education is a critical issue. The application of digital technologies including, computers, online platform, virtual reality, augmented reality into simulated and remote laboratories is offering substantive solutions to the persistent challenges. (Benefits of Digital Technical and Vocational Education & Training, Nader Imani, Shem Okere Bodo)

1.3 GOVERNMENT INITIATIVE FOR DIGITALISATION

Some of the initiatives by Government of India to increase the use of Digital Technology in Technical and Vocational Education for Incorporation of digital literacy, faster curriculum adaption improving the quality of the curriculum, meeting the industry needs more learner capacity : **Skill India Digital (SID)** Through this initiative the Ministry of Skill Development and Entrepreneurship aims to upskill Indian youth to improve livelihood opportunities and cater to Industry specific demand and supply gap and labour shortage. **Hub & Spok module of Vocational Education** – Initiative taken by Ministry of Education under smagra Shiksha Abhiyan - a pan India Government funded Scheme to vocationalise education and support Teacher Training

Institution where the Hub of School Infrastructure facilities can be used by the Spoke School student for Vocational Education and Training. **Bharat Skill** is Central Skill repository of Director General of Training which provides people with course material, videos, NSQF curriculum, question bank, mock test, etc. by clicking a course of their choice, **Kaushal e-pustakalay** E-Book reader application of NSDC provides easy access to digital books in sector and trade of their choice. **Pradhan Mantri Vikas Yojana (PMVY)** Pradhan Matri Skill Development Scheme offer digital learning measures to trainees which covers their chosen job role in all sectors. The material is Self-paced multilingual and can be accessed any time and anywhere. **Kaushal Panjee (Skill Register)** Kaushal Application, Psychometric skill and personality test are offered by Ministry of Rural Development to help rural youth to decide their career path. **Strat-up Village Entrepreneurship Programme (SVEP)s** Issues for India's digital transformation in TVET is the demand and supply of informal labours, since they are not adapt to digital technology.

1.4 IMPORTANT ISSUE FOR INDIA'S DIGITAL TRANSFORMATION IN TVET

1. There is demand and supply of informal labourers since they do not adapt to the digital technology.
2. National Skill Development corporation and member organisation adopting aggressive partnership approach with employer and investors to fulfil the needs, requires continuously monitoring, fine-tuning and updating system and processes to meet the growing needs of Industry and employers.
3. Limited access to technology and digital resources.
4. Many teachers have not received formal training in digital literacy.
5. Vocational Education Programmes often have tight schedules and specific Industry requirements that make it difficult to allocate sufficient time and resources to digital literacy.

1.5 PROBLEM STATEMENT:

Digitalisation help ITI's to align with industry needs. Digitalisation increases teaching and learning efficiency. Students gain practical knowledge through smart classrooms, virtual simulations, hence it helps them to develop industry skills and increases employability. In spite of various initiatives, students and teacher's various problems while using digital tools. The study aims to understand the changes introduced due to use of digital tools in teaching and learning process. It also helps to explore pros and cons of digitalisation in ITI's.

1.6 LITERATURE REVIEW

1. **The Impact of Digital Technologies on Vocational Education and Training needs – An Exploratory study in the German Food Industry, Claudia Achtenhagen, Leona Achtenhagen (Volume 61, Issue 2)** studies the students' needs and expectations, impact of digital transmission on their professional training. The results points to supplement the curriculum with specialised courses in emerging technology.

2. **Digitalisation & Blending of Training Programmes – A study of ILO**, stated that digitalisation is merely a minor change but a fundamental reimagining of how skill are imparted and acquired. The potential benefits of digital transformation in training are extensive. The opportunities to reach to new population reduced cost comprises different learning styles, enhances inclusivity and sustainability and equips learner trains with digital skill essential for success in the dynamic labour market.

TVET use digital technology to be reachable, reasonable & tailored while improving its quality and labour market opportunities.

- How it transformed Teaching and Learning, delivery process- Using technology to stimulating gamify and practical oriented learning environment using blended learning.
- Changes within the Organisation and Management of TVET providers and commuters – Digital tools create, combines flexible individualised learning pathways.
- Changes in the role of TVET providers within their education and labour market ecosystem and communities. – To create digital partnerships with local organisation by creating hubs that can reachable by business and communities to increase local investment and Research and Development opportunities.

3. Enhancing Technical Vocational Education & Training (TVET) through digital transformation in developing countries

This document studies a context, trends, and challenges inherent to digital transformation in TVET. How TVET system can be enhanced through digital transformation in low- and middle-income countries. Various digital initiatives in TVET at all levels are taken such as :

1. System Digital Schools & Countrywide Integrated Digital Skill Platform
2. Pedagogical Classrooms
3. Curriculum (Physical, Digital & Phygital courseware and learning modules depending on job role and sector.
4. Technical (Digital library & skills)

5. Global Trends in Vocational Training Education: A Bibliometric Analysis - (Selvi Rajamanickam1*, Ridzwan Che' Rus1, Mohd Nazri Abdul Raji1, Hattori Mina2, Rian Vebrianto3, 2024) This study examines global trends in vocational training, technologies through a comprehensive bibliometric analysis. It studies the evolution of research trends highlights emerging topic and states distribution of knowledge in vocational training and education provide insight to educators, policymakers and stakeholders. The paper studies 366 articles selected from Scopus database from bibliometric analysis from 2020-24.

Purpose of this study is to study how far ITI students use digital technology in their daily academic work. The paper also analyses what problems they are facing while using digital tools and also to give possible solutions. The study is based on Primary and Secondary data. Primary is collected through Google Form from various ITI's in Mumbai Suburbs. The study has shown the impact of digital technologies on student and overall working of their teaching and learning experience. The study suggested effective implementation of digital technologies.

1.7 AIMS AND OBJECTIVES

1. To study the use of Digital tool by students, Instructor in their daily academic work in institutions.
2. To understand the problems faced by students while using the digital technology.
3. To provide possible solution to the problems.

1.8 RESEARCH METHODOLOGY OF THE STUDY :

The study uses both primary and secondary methods to collect the data to gain comprehensive understanding of role of digitalisation in ITI's.

Primary Data Collection:

Primary data is collected from the students directly who are currently undergoing training in Shahpur and Ulhasnagar ITI's. A structured questionnaire was prepared to collect data from 82 ITI students across various trades to gather information on their daily use of digital tools in their day to day learning, impact of digitalisation – positive and negative, problems faced by trainees as well as teachers while using digital tools and suggestions to solve the problems.

Secondary Data Collection:

Secondary data is collected through research papers, news articles, and website, etc.

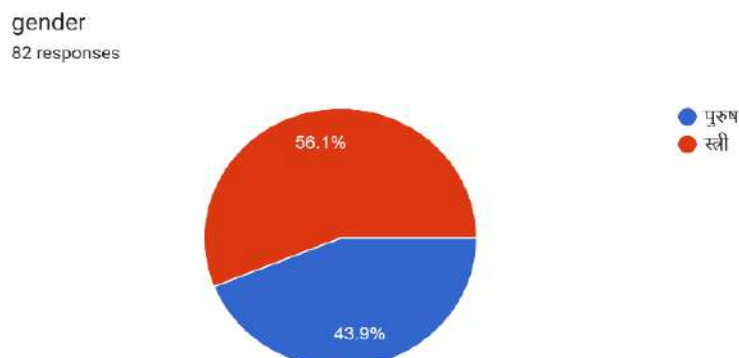
1.9 DATA ANALYSIS & INTERPRETATION

A simple percentage method is used to analyse the collected data by Pie graph.

The major limitation of study is using simple analysis technique. The language used for collection of data is Marathi as students are more comfortable with Marathi.

1.General Information:

a) Gender:

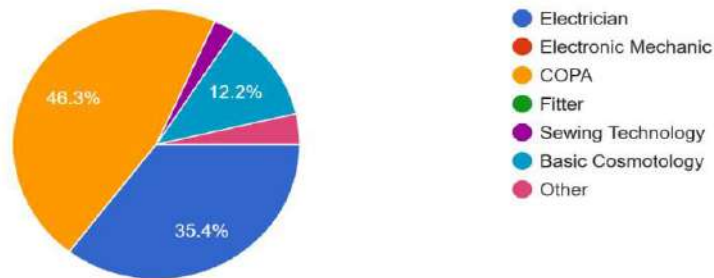


56.1% Female Students and 43.9% Male Students contributed to this research.

b) Trades:

व्यापार

82 responses

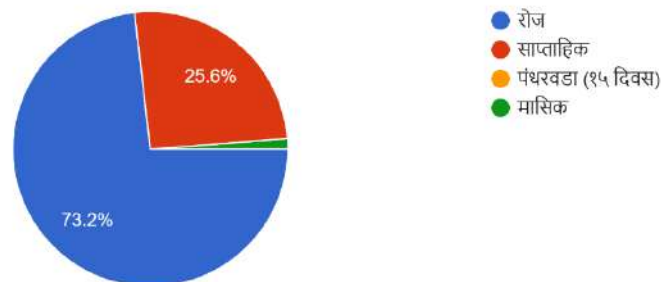


Most of the respondents are from COPA (Computer Operator and Programming Assistant) 6.3% from Electrician trade 35.4%, 12.2% from Basic Cosmetology and 6.1% from Sewing Technology.

C) How often digital tools are being

How often do you use the institution's digital tools for academic or administrative work?

82 responses



Above pie graph show how much time digital tools were used for academic or administrative purpose. 73.2% students as well as teacher and other administrative staff uses digital tools daily. 25.6% of them uses digital tools weekly.

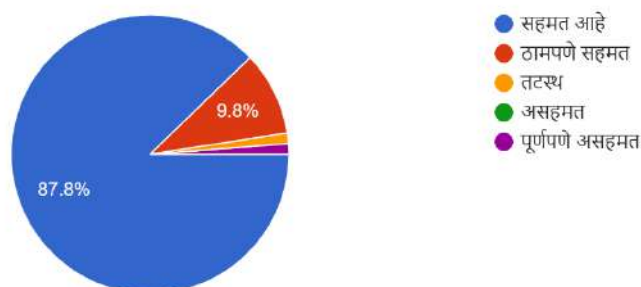
2. Impact of Digitalisation on ITI

Use of digital tools in day today working of ITI's is useful in many ways. It has reduced the complexity of operation, saves time and money. Digitalisation made teaching and learning process efficient.

a) Teaching and learning process

Digitalization makes the teaching and learning process more interactive and engaging.

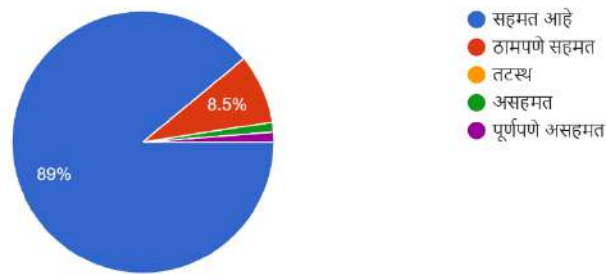
82 responses



Above pie graph shows digitalisation make teaching and learning process more interactive and engaging majority i.e. 87.8% students agree and 9.8% strongly agree with it.

b) Matching skills with Modern Digitalized Industries

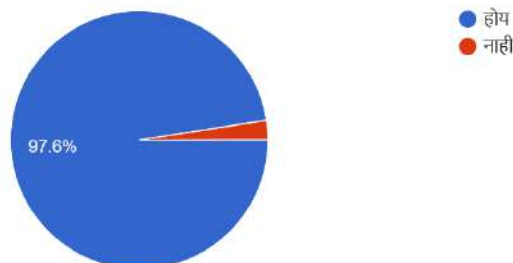
Digitalization helps match skills with the real demands of modern digitalized industries.
82 responses



89% of the students agree and 8.5% strongly agree that digitalization help match skill with the practical demand of modern digitalized industries.

C) Increases Employment Opportunities

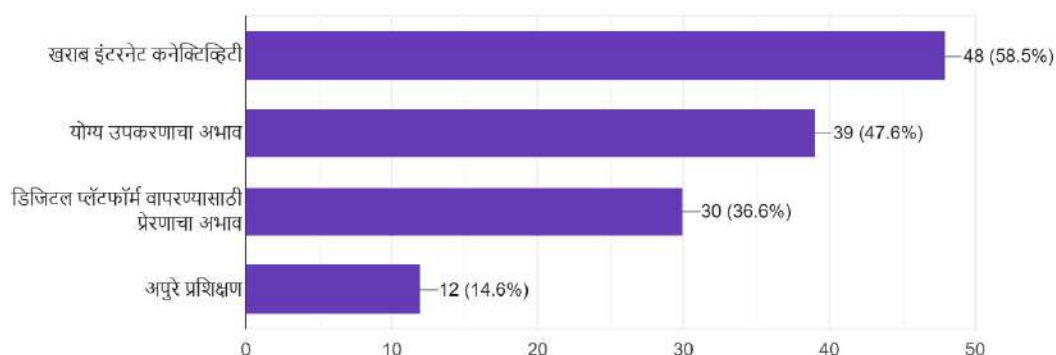
Digitalization increases employment opportunities
82 responses



As shown in the above pie-graph out of 82 respondents 97.6% answered Yes that digitalization increases employment opportunities while 2.4% answered No. This shows that majority of respondents have a positive response towards the statement.

3. Problems faced while using Digital tools:

The main problems you face when using digital platforms
82 responses



Based on the above Bar graph it can be stated that Poor Internet Connectivity is main problem students face while using digital tools i.e. 58.5% , Lack of proper digital equipment's or tools is another problems noted by 47.6%. Also another problem is Absence of motivation for using digital platform is administered by 36.6% respondents while 14.8% claimed lack of proper training is the problem.

Based on the above analysis it can be stated that ITI students face problem while using digital platforms.

1.10 CONCLUSION

Digitalization in Industrial Training Institutions opens new opportunities for students, making them future ready to adapt with new technology. The study explored various problems faced by ITI students such as lack of training, lack of digital equipment, poor internet connectivity, technical problems and lack of motivation for using the digital platform.

The research also identified some positive effects such as improvement in quality of education, improvement in teaching and learning, increase in administrative efficiency, increase in job opportunities, etc. Some measures recommended such as provision of a fast and reliable internet connection; strengthening digital safety and cyber security. Programs should be implemented to upgrade the digital technology from time to time. Furthermore, faster collaboration and partnership between industry educational institutions and policy makers leads to more practical resources and alignment with digital skill in India.

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AN ANALYTICAL STUDY OF THE IMPACT OF ARTIFICIAL INTELLIGENCE ON BANKING OPERATIONS

¹Ms. Simran Bharat Chawla, ²Ms. Muskan Wadhwa and ³Ms. Krishnadayanka. R. Shet

Assistant Professors, R.K.T College of Arts, Commerce and Science (CMC)

ABSTRACT

The rapid progress of Artificial Intelligence (AI) has greatly transformed banking operations by enhancing efficiency, accuracy, and customer-centric services. This study logically examines the impact of AI on various functional areas of the banking sector, including customer service, credit evaluation, risk management, fraud detection, compliance, and back-office automation. AI-driven technologies such as machine learning, natural language processing, robotic process automation, and predictive analytics enable banks to process vast amounts of data in real time, leading to faster decision-making and improved operational performance.

This paper makes an effort to examine the role of Artificial Intelligence in transforming banking operations, with a particular focus on how AI enhances operational efficiency, customer experience, and decision-making processes within the banking sector. It explores the application of AI-driven technologies such as machine learning, natural language processing, and automation in areas including customer service, credit assessment, fraud detection, risk management, and regulatory compliance. The study also discusses the challenges associated with the adoption of AI in banking operations, such as data privacy concerns, ethical issues, high implementation costs, algorithmic bias, and workforce displacement. Furthermore, the paper highlights developing trends and innovations in AI that are expected to shape the future of banking, including predictive analytics, generative AI, intelligent automation, and adapted financial services. The study concludes that while AI presents significant opportunities for improving banking performance and competitiveness, its successful implementation requires a balanced approach that integrates technological advancement with ethical practices, regulatory frameworks, and human capability.

Key Words: Artificial Intelligence, Banking Operations, Machine Learning, Fraud Detection, Financial Technology (FinTech)

I. INTRODUCTION

The banking sector has gone through significant transformation over the past decade due to fast technological advancements. Among these, Artificial Intelligence (AI) has developed as one of the most influential technologies reshaping banking operations. AI refers to the imitation of human intelligence in machines that are programmed to think, learn, and make decisions. Banks are increasingly adopting AI to increase efficiency, accuracy, and customer satisfaction in an increasingly competitive and digital financial environment.

Traditional banking systems often rely on manual processes and rule-based systems, which are time-consuming, error-prone, and inefficient when handling large volumes of data. AI-based systems, on the other hand, can analyze vast datasets in real time, detect patterns, and generate actionable understandings. This capability has made AI a crucial tool in areas such as customer service, credit assessment, fraud detection, risk management, and regulatory compliance.

This research paper aims to analytically study the impact of Artificial Intelligence on banking operations, focusing on its benefits, applications, challenges, and future prospects.

II. REVIEW OF LITERATURE**1. Kumar and Sharma (2025)**

Kumar and Sharma (2025) studied the future prospects of Artificial Intelligence in the banking sector, emphasizing emerging trends such as generative AI, intelligent automation, and hyper-personalized financial services. The study found that AI will play a critical role in enhancing strategic decision-making and improving financial inclusion. However, the authors noted that high implementation costs and regulatory uncertainties remain key barriers, particularly for small and medium-sized banks.

2. Kumar and Gupta (2023)

Kumar and Gupta (2023) studied the application of Artificial Intelligence in Indian banking operations with special reference to public and private sector banks. The study found that AI technologies such as machine learning and data analytics have considerably improved operational efficiency by automating routine banking processes and reducing processing time. The authors observed that AI-based systems enhance decision-making accuracy in areas such as credit assessment and customer profiling.

However, the study also highlighted challenges related to data security, high implementation costs, and resistance to technological change among employees.

3. Sharma and Mehta (2023)

Sharma and Mehta (2023) analyzed the role of AI-driven customer service solutions in Indian banks. Their research highlighted the growing use of chatbots and virtual assistants to improve customer engagement and service availability. The authors concluded that AI has positively impacted customer satisfaction by offering round-the-clock services and personalized responses. At the same time, they pointed out that lack of customer awareness and trust issues remain major barriers to widespread adoption of AI-based banking services in India.

4. Singh and Kaur (2024) examined the effectiveness of Artificial Intelligence in fraud detection and risk management within Indian commercial banks. The study revealed that AI-powered fraud detection systems are more efficient than traditional rule-based models in identifying doubtful transactions and minimizing financial losses. According to the authors, predictive analytics and machine learning enable banks to proactively manage risks. However, the research also raised concerns about algorithmic bias and the need for transparent AI models to ensure fairness in banking decisions.

III. OBJECTIVES OF THE STUDY

The main objectives of this study are:

1. To study the role of Artificial Intelligence in changing banking operations
2. To analyze the application of AI in customer service, credit evaluation, risk management, fraud detection, and agreement
3. To identify challenges connected with AI adoption in the banking sector
4. To explore emerging AI trends shaping the future of banking

IV. ROLE OF ARTIFICIAL INTELLIGENCE IN BANKING OPERATIONS

Artificial Intelligence plays a crucial role in modern banking by automating routine tasks, enhancing accuracy, and enabling data-driven decision-making. AI systems can process organized and unorganized data, learn from old patterns, and continuously improve performance. Banks use AI to optimize operations, reduce costs, improve customer engagement, and manage risks effectively.

AI-driven banking operations include intelligent automation of back-office functions, predictive analytics for customer behavior analysis, real-time fraud detection, and personalized financial recommendations. As a result, banks can deliver faster, more secure, and customized services to customers.

V. APPLICATION OF AI IN CUSTOMER SERVICE

Customer service is one of the most visible areas where AI has made a major impact. AI-powered chatbots and virtual assistants use Natural Language Processing (NLP) to understand customer queries and provide instant responses. These systems are available 24/7, reducing waiting times and improving customer satisfaction.

For example, banks use AI chatbots to handle routine inquiries such as checking account balance, transaction history, loan information, and solving queries. Voice assistants and conversational AI further improve customer interaction by offering continuous and personalized banking experiences.

VI. AI IN CREDIT EVALUATION AND LOAN PROCESSING

AI has transformed credit evaluation by supporting faster and more accurate assessment of borrower creditworthiness. Traditional credit scoring models rely on limited financial data, whereas AI-based models analyze a wide range of data, including transaction history, spending behavior, and alternative data sources.

Machine learning algorithms help banks assess risks more precisely, reduce default rates, and improve loan approval efficiency. AI also automates loan processing by verifying documents, detecting discrepancies, and reducing human involvement, thereby progressing approval timelines.

VII. AI IN FRAUD DETECTION AND RISK MANAGEMENT

Fraud detection is one of the most critical applications of AI in banking. AI systems continuously monitor transactions, identify unusual patterns, and detect fraudulent activities in real time. Machine learning models learn from past fraud cases and adapt to new fraud techniques.

In risk management, AI helps banks assess market, credit, and operational risks by analyzing large datasets and forecasting potential threats. Predictive analytics enables practical risk mitigation and improves financial stability.

VIII. AI IN REGULATION COMPLAINTS AND BACK-OFFICE AUTOMATION

Regulatory compliance is difficult and resource-rigorous for banks. AI helps automate compliance processes by monitoring transactions, identifying suspicious activities, and ensuring adherence to regulatory requirements. Natural Language Processing is used to analyze regulatory documents and update compliance frameworks.

Robotic Process Automation (RPA) is widely used in back-office operations to automate repetitive tasks such as data entry, understanding, report generation, and account management. This reduces operational costs, errors, and processing time.

IX. CHALLENGES IN THE ADOPTION OF AI IN BANKING

Despite its benefits, AI adoption in banking faces several challenges:

- **Data Privacy and Security:** Handling sensitive customer data raises privacy concerns
- **High Implementation Costs:** AI systems require major investment in infrastructure and expertise
- **Ethical Issues:** Algorithmic bias and lack of transparency can impact fairness
- **Workforce Displacement:** Automation may reduce demand for certain job roles
- **Regulatory Uncertainty:** Existing regulations may not fully address AI-based operations

Banks must address these challenges through ethical AI practices, strong governance frameworks, and continuous employee upskilling.

X. EMERGING TRENDS AND FUTURE OF AI IN BANKING

The future of banking is expected to be focused on advanced AI innovations such as generative AI, intelligent automation, hyper-personalization, and predictive analytics. Banks will increasingly use AI to provide customized financial products, improve financial inclusion, and develop strategic decision-making.

AI-powered advisory services, personalized investment recommendations, and proactive risk management solutions will redefine customer relationships. Co-operation between banks, FinTech firms, and regulators will further quicken AI-driven transformation.

XI. CONCLUSION

Artificial Intelligence has emerged as a transformative force in banking operations, offering great benefits in efficiency, accuracy, and customer-centric services. From customer service and credit assessment to fraud detection and regulatory compliance, AI-driven technologies have reshaped traditional banking processes. However, successful AI implementation requires addressing challenges related to data privacy, ethical concerns, regulatory compliance, and workforce transformation.

The study concludes that while AI presents major opportunities for improving banking performance and competitiveness, a balanced and responsible approach combining technological innovation, regulatory oversight, and human capability is essential for the sustainable future of the banking sector.

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THE IMPACT OF ARTIFICIAL INTELLIGENCE (AI) ON STUDENTS' ACADEMIC DEVELOPMENT

Sona Deepaklal Dawra and Paree Lakhan Ahuja

Assistant Professor, Seva Sadan College of Arts, Science and Commerce, Ulhasnagar

ABSTRACT

The integration of Artificial Intelligence (AI) in education has transformed academic learning, offering both opportunities and challenges for students' development. The use of Artificial Intelligence is growing rapidly not only in education system but in all aspects for eg: Financial Services, Banking Services etc.

A mixed-methods approach was employed, utilizing surveys administered to students from diverse educational backgrounds. The findings revealed widespread adoption of AI tools among students, with a generally positive outlook on their potential to enhance academic performance. However, the study also identified a nuanced picture, with observations of both positive outcomes (e.g., improved grades) and negative consequences (e.g., facilitated cheating) since the integration of AI technologies. The study emphasizes the importance of strategic AI integration to optimize learning and student success. By providing valuable insights into the role of AI in shaping student academic Development, this research informs decision-making and practice in educational settings, paving the way for informed and effective utilization of AI technologies in education.

Keywords: Artificial Intelligence, education; academic development; personalized learning.

INTRODUCTION

In recent years, artificial intelligence (AI) has gained significant popularity in the field of education. AI refers to the development of computer systems capable of activities typically requiring human intelligence, such as speech recognition, visual perception, decision-making, and language translation. In education, AI applications include personalization of learning experiences, automation of administrative tasks, and provision of insights into student performance.

Artificial Intelligence (AI) has rapidly transformed various sectors of society, and education is no exception. From intelligent tutoring systems to automated grading and personalized learning platforms, AI-powered technologies are reshaping how students learn, interact with educational content, and develop academically. As digital tools become more integrated into classrooms and online learning environments, understanding the impact of AI on students' academic development has become increasingly important.

AI in education refers to the use of machine learning algorithms, data analytics, and adaptive technologies to enhance teaching and learning processes. Platforms such as Khan Academy and tools developed by companies like OpenAI provide personalized feedback, interactive problem-solving support, and on-demand explanations that cater to individual learning needs. These innovations aim to improve academic performance by identifying students' strengths and weaknesses, adjusting content difficulty, and offering targeted interventions.

One of the most significant advantages of AI in education is personalized learning. Traditional classrooms often struggle to meet the diverse needs of students with varying learning speeds and styles. AI systems can analyze performance data in real time and adapt instructional materials accordingly, helping students grasp complex concepts more effectively. This tailored approach promotes deeper understanding, increases engagement, and may lead to improved academic outcomes. However, the integration of AI also presents challenges. Concerns regarding academic integrity, over-reliance on automated systems, data privacy, and unequal access to technology raise important questions about the long-term effects of AI on student development. While AI can support critical thinking and independent learning when used appropriately, excessive dependence may hinder the development of essential cognitive and problem-solving skills.

LITERATURE REVIEW

Key Insight: Many studies highlight that AI enhances personalized learning by adapting content to the individual needs of students.

- AI-driven systems can assess a learner's strengths, weaknesses, and pace, allowing for **customized learning paths**. This personalization has been linked to improved understanding and retention of subject matter compared to traditional one-size-fits-all approaches.

Example: Intelligent tutoring systems like ALEKS and Carnegie Learning's cognitive tutors use machine learning to pinpoint knowledge gaps and recommend tailored exercises.

- Researchers note that adaptive learning technologies can **increase student engagement** and motivation by providing timely feedback and reinforcement. Students are more likely to remain engaged when content aligns with their current level of understanding.

REPRESENTATIVE STUDIES

- **Woolf (2010)** emphasized that adaptive systems can mimic one-on-one instruction, leading to deeper conceptual mastery.
- **Pane et al. (2015)** found that adaptive software improved math achievement among middle school students.

2. Automated Assessment and Feedback

Key Insight: AI's role in automating assessments can reduce instructor workload and provide students with immediate feedback.

- Tools such as automated essay graders and quiz systems can analyze student responses quickly and consistently. This immediate feedback helps learners correct misconceptions before they become entrenched.
- Studies show that immediate feedback is linked to better academic performance, especially in formative learning tasks.
- However, concerns remain that automated systems may not fully capture the nuance of higher-order thinking, creativity, or complex reasoning.

REPRESENTATIVE STUDIES

- **Shermis & Burstein (2013)** showed that automated essay scoring systems can reliably assess grammar and structure, but may struggle with deeper semantic evaluation.

Research Methodology

This research paper is based on the primary data collected through the questionnaire made using Google forms as well as Secondary data from the journals, Magazines and websites. Approximately 60 responses are collected for this research which includes all the age groups i.e. (Below 18yrs to 60yrs above).

Objectives of the study

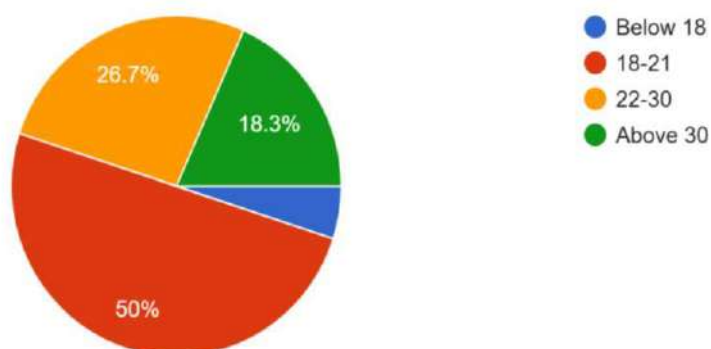
1. To Know the Impact of Artificial Intelligence (AI) on Students' Academic Development
2. To understand whether AI impacts the Students' Academic Performance positively or negatively or both.

DATA ANALYSIS AND INTERPRETATION OF THE STUDY

Approximately 60 responses are collected for this research which includes all the age groups i.e.

(Below 18yrs to 60yrs above).

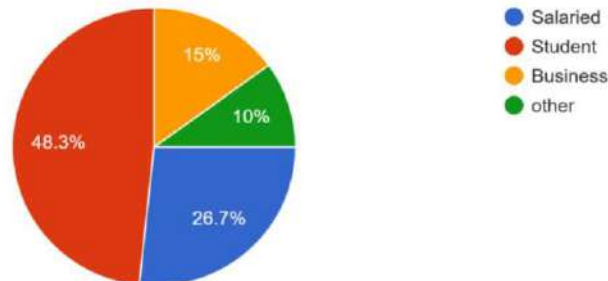
Age Group	Percentage
Below 18	5%
18-21	50%
22-30	26.7%
Above 30	18.3%



Approximately 60 responses are collected for this research which includes the occupation i.e.

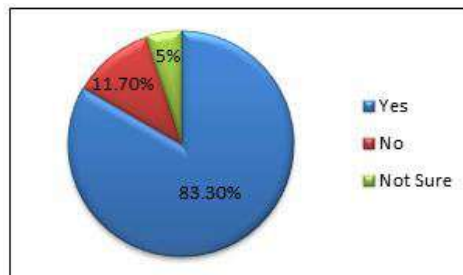
(Salaried, Student, Business and Other).

Occupation	Percentage
Salaried	26.7%
Student	48.3%
Business	15%
Other	10%



Q.1. Have you noticed any impact of AI on your academic performance / Development?

Yes	83.30%
No	11.70%
Not Sure	5%

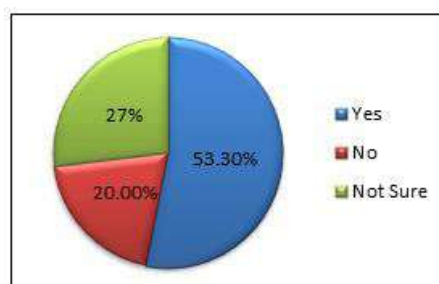


Interpretation:

It is observed that 83.30% of the respondents had noticed impact of AI on academic Performance where as 11.70% had not noticed any impact of AI on their academics and 5% are not sure.

Q.2. Do you think AI can replace human teachers in the future?

Yes	53.30%
No	20.00%
Not Sure	27%

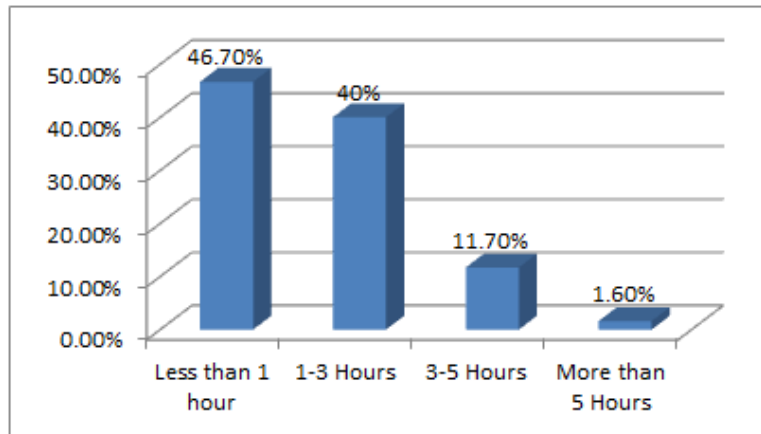


Interpretation:

It is observed that 53.30% of the respondents think that AI can replace human teachers in the future where as 20% had not noticed any impact of AI on their academics and 27% are not sure.

Q.3. How much time do you spend using AI-based educational tools per week?

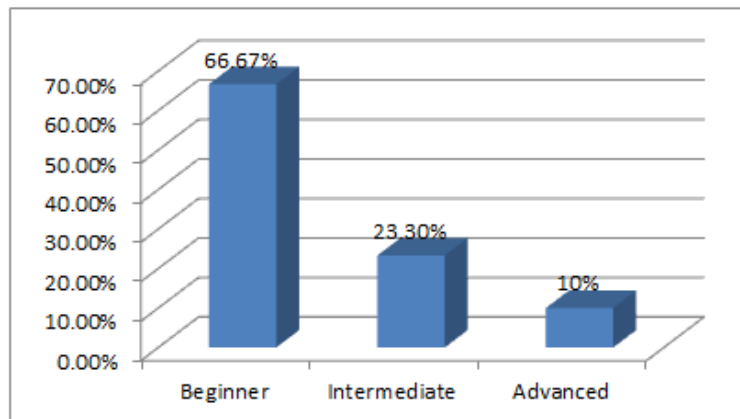
Duration	Percentage
Less than 1 hour	46.70%
1-3 Hours	40%
3-5 Hours	11.70%
More than 5 Hours	1.60%

**Interpretation:**

It is observed that 46.70% of the respondents spent less than 1 hour on AI based educational tools per week where as 40% spent 1 hour to 3 hours on AI based educational tools per week. Only 1.6% spent more than 5 hours and 11.70% spent 3 to 5 hours per week.

Q.4. How would you rate your Proficiency in using AI technologies?

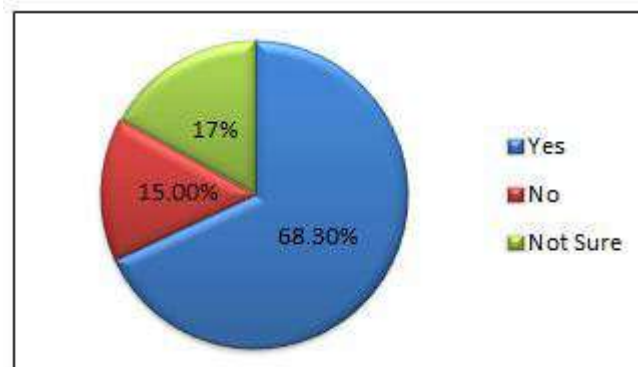
Beginner	66.67%
Intermediate	23.30%
Advanced	10%

**Interpretation:**

It is observed that 66.67% of the respondents are beginner in using AI technologies where as 23.30% are intermediate and 10% belongs to advanced category.

Q.5. Do you feel that AI is more effective than traditional teaching methods

Yes	68.30%
No	15.00%
Not Sure	17%

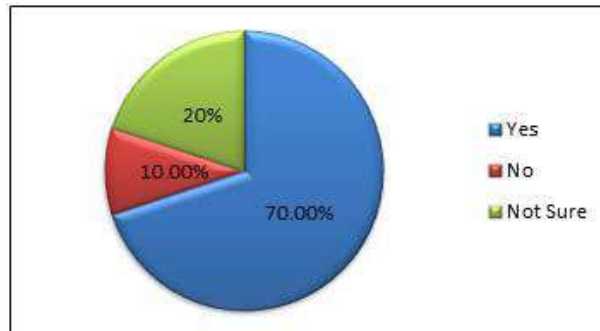


Interpretation:

It is observed that 68.30% of the respondents feels that AI is more effective than traditional teaching methods where as 15% does not agree for the same and 17% are not sure.

Q.6. Do you believe that AI-based tools can help reduce academic workload and stress?

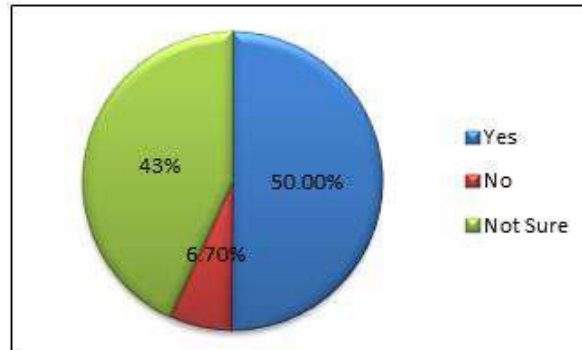
Yes	70.00%
No	10.00%
Not Sure	20%

**Interpretation:**

It is observed that 70% of the respondents believe that AI-based tools can help reduce academic workload and stress where as 10% does not agree for the same and 20% are not sure.

Q.7. Do you think AI can enhance creativity and critical thinking skills in students?

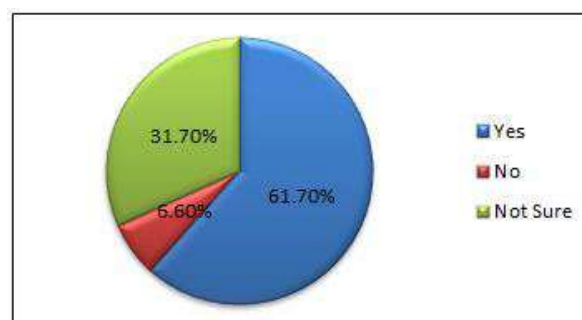
Yes	50.00%
No	6.70%
Not Sure	43%

**Interpretation:**

It is observed that 50% of the respondents think AI can enhance creativity and critical thinking skills in students where as 6.7% does not agree for the same and 43% are not sure.

Q.8. Do you find AI-based tools helpful in improving your understanding of difficult concepts?

Yes	61.70%
No	6.60%
Not Sure	31.70%

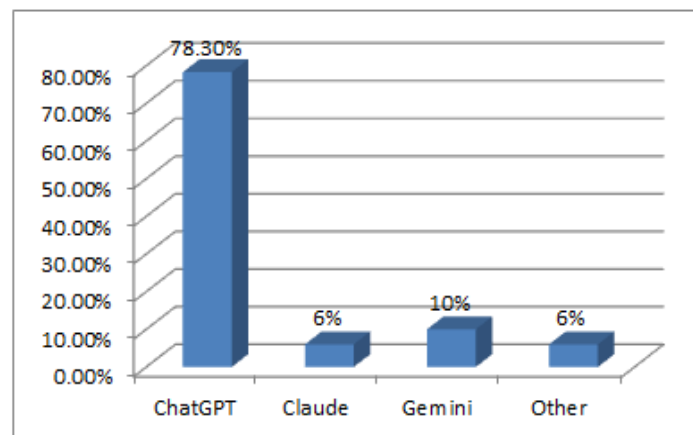


Interpretation:

It is observed that 61.70% of the respondents finds that AI-based tools are helpful in improving their understanding of difficult concepts where as 6.6% does not agree for the same and 31.70% are not sure.

Q.9. Which of the following AI tool you used the most?

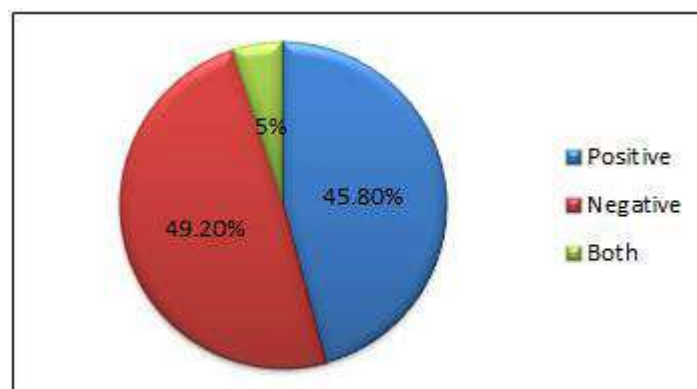
ChatGPT	78.30%
Claude	6.7%
Gemini	10%
Other	5%

**Interpretation:**

It is observed that 78.30% of the respondents use ChatGPT as AI tool the most for their work. Only 10% and 6% of the respondents' uses Gemini and Claude as AI tool the most and 6% uses other AI tools.

Q.10. what impact do you see AI having on your Academic Development

Positive	45.80%
Negative	49.20%
Both	5%

**CONCLUSION**

Our research aimed to explore the impact of artificial intelligence (AI) on student academic Development. Through surveys, we found widespread AI tool usage among students, with optimism regarding its potential to 45.80% positively impact and 49.20% negatively Impact. Observations of changes in student academic achievement since AI implementation revealed both positive outcomes (e.g., improved grades) and negative consequences (e.g., facilitated cheating In conclusion, our study provides valuable insights into the impact of AI on student academic Development. By addressing challenges and building upon our findings, we can harness the full potential of AI to empower students and educators, ultimately enhancing learning experiences and outcomes in the digital age.

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A STUDY ON THE USAGE OF MOBILE BANKING APPLICATIONS BY THE CUSTOMERS IN ULHASNAGAR

Sruthi Kumar KurumboorAssistant Professor, Department of Accountancy, R. K. Talreja College of Arts, Science and Commerce,
Ulhasnagar

kurumboorsruthi@gmail.com

ABSTRACT

In this age of digitisation there has been a change in the preferences of methods of banking used by the customers. More and more customers today are resorting to using mobile banking applications instead of visiting the banks for doing banking transactions. They use mobile banking due to its convenience, low transaction fees, speed and efficiency, ease of usage, 24/7 access, enhanced security, personalisation. Today, most of the customers are aware about the usage of mobile banking applications because of which there is huge shift from traditional banking methods to modern banking methods. This research paper aims to study the users of Mobile Banking Applications in Ulhasnagar. It aims to study the demography, nature of transactions and the understand the challenges faced by the users of Mobile Banking Applications. It also studies whether there exists a relationship between age, education, gender and problems encountered with the usage of Mobile Banking Applications. The data for this research would be collected by Primary and Secondary sources. Primary data would be collected through questionnaire. The sample size would be 100 respondents. The data collected by questionnaire would be analysed with the help of graphs, pie-charts and tests.

Keywords: Mobile Banking Applications, Ulhasnagar, Customers.

INTRODUCTION

Mobile Banking Application refers to making use of software application provided by the bank which allows customers to perform banking services online through their mobile devices. One of the earliest used Mobile Banking services was by means of an SMS. Unlike Internet Banking, Mobile Banking is mostly done by an application provided by the Bank. Mobile Banking applications are mainly used for transactions like Bill Payments, Checking Balances, Bank Transfers, Fixed Deposits and other investments, Customer Care Services and Card Management. This new way of banking is now preferred because of 24/7 access to banking services, convenience, low transaction fees, user friendly mobile banking applications. In this age of digitisation where almost every household has an internet connection and with the rise in the usage of mobile data services there has also been an increase in the usage of Mobile Banking Applications to get financial transactions done. Nowadays customers also get rewarded for Mobile Banking Application referrals.

This research is focused on the usage of Mobile Banking Applications by the customers in Ulhasnagar. It would help us to understand the demography and nature of transactions done by Mobile Banking Applications. Along with this it would also help us to know about the challenges encountered by the users of Mobile Banking Applications.

REVIEW OF LITERATURE

Md Mehedi Hasan Emon et al., (2023) in their study on ‘Customer attitudes towards the use of mobile banking applications offered by private banks in Bangladesh’ highlighted the fact that awareness campaigns should be held regarding the usage of mobile banking applications. It also mentioned the need for improving the technical infrastructure of the applications which would reduce the time involved in transactions and at the same time the study also suggested to introduce personalised services based on customer banking behaviour and preferences.

S. Gayathri & Dr. P. S. Buvaneswari (2019) in their study ‘Consumers Behaviour Towards Mobile Banking Applications’ has conducted this study on the usage of mobile banking applications in the rural areas. This study has pointed out the fact that though banking applications are being used in the rural areas the applications are not being used to its full potential. Hence, it is suggested that the application should be created in such a way that it is easier to use and at the same time they should be made aware about the various uses of the mobile banking applications which they are unaware of.

Chandan Raj S M & Bindu V (2022) in their paper titled ‘A Study on Customer Perception & Attitude Towards Online Banking in Thiruvananthapuram District, Kerala’ has suggested that to avoid any delays while using banking applications they should be updated frequently.

Senior citizens should be made aware about E-Banking and its processes. It has also mentioned that in order to attract the customers, they should be educated on the benefits of E-Banking.

Gisa George & Johnsy Mary Johnson (2019) in their study on ‘Students attitude towards Mobile Banking with reference to Bangalore’ has advised to increase security measures, facilitate privacy protection. It has also recommended to give sufficient, specific and detailed guidelines to the users of Mobile Banking facilities. It also mentions that discounts, coupons, rewards, loyalty points increase the attractiveness of mobile phones as a means of payment.

OBJECTIVES

1. To analyse the demography of the users of Mobile Banking Applications.
2. To ascertain the nature of transactions for which Mobile Banking Applications are used the most.
3. To understand the challenges faced by the users of mobile banking applications.

HYPOTHESIS

Hypothesis 1

H₀- There is no significant relationship between age and usage of mobile banking applications.

H₁. There is a significant relationship between age and usage of mobile banking applications.

Hypothesis 2

H₀- There is no significant relationship between education and usage of mobile banking applications.

H₁. There is a significant relationship between education and usage of mobile banking applications.

Hypothesis 3

H₀- There is no significant relationship between gender and usage of mobile banking applications.

H₁. There is a significant relationship between gender and usage of mobile banking applications.

Hypothesis 4

H₀. There is no significant relationship between problems encountered and usage of mobile banking applications.

H₁. There is a significant relationship between problems encountered and usage of mobile banking applications.

RESEARCH METHODOLOGY

The purpose of this research is to study about the usage of Mobile Banking Applications by the customers in Ulhasnagar. Data required for this has been collected by Primary as well as Secondary Method of data collection. The Primary data was collected by questionnaire which was created using Google Forms. For this purpose, data has been collected from 100 respondents.

After this the collected data was analysed by using Pie Charts and Bar Graphs. Then the hypothesis was put to test. The hypothesis testing was done by Chi-Square test. The Chi-Square test is a statistical procedure for determining the difference between observed and expected data. It is of two types- Chi-Square test of Independence and Chi-Square Goodness of fit test. The hypothesis in this research has been tested using the Chi-Square test of independence.

DATA ANALYSIS AND INTERPRETATION

The data was collected from 100 respondents by the means of a questionnaire which was prepared using google forms. The collected data has been presented in the form of Pie-Charts and Graphs.

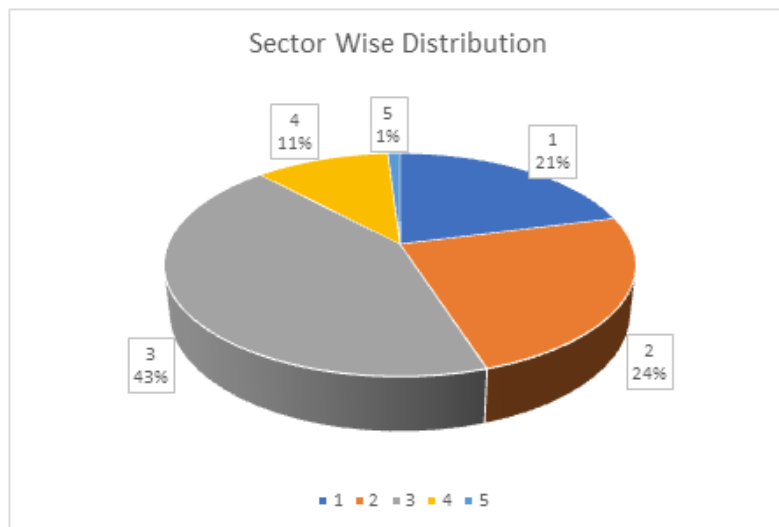
SECTORAL ANALYSIS**Figure 1**

Figure 1 shows us the count of customers using Mobile Banking Applications. The users have been grouped into the sectors they live in Ulhasnagar. As per the above data, the highest number of users of Mobile Banking Applications stay in Ulhasnagar-3 and the lowest number of users stay in Ulhasnagar-5.

DEMOGRAPHY ANALYSIS**Age Wise Classification****Table 1**

Age	Count
0-20	35
21-40	60
41-60	2
61-80	3

Source: Primary Data

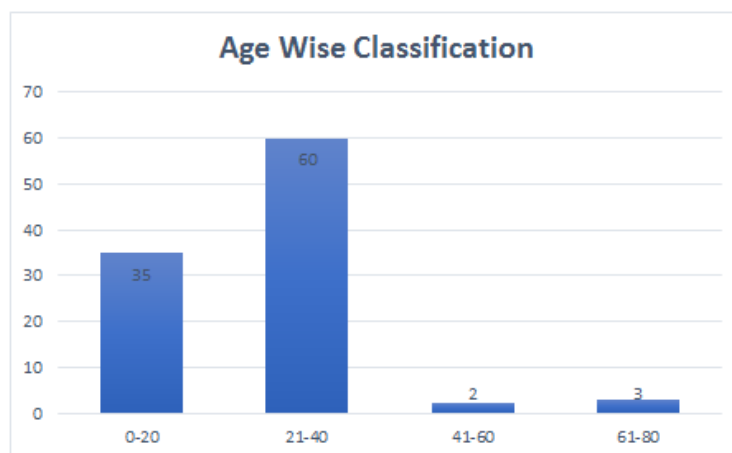
**Figure 2**

Table 1 shows the user classification as per Age. From this we observe that maximum users belong to the age group of 21-40 whereas the least number of users belong to the age group of 41-60.

Gender Wise Classification**Table 2**

Gender	Count
Male	34
Female	65
Other	1

Source: Primary Data

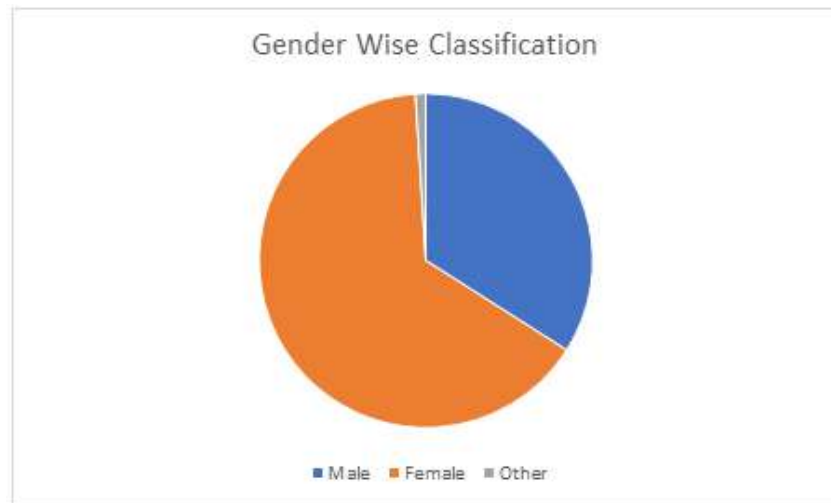
**Figure 3**

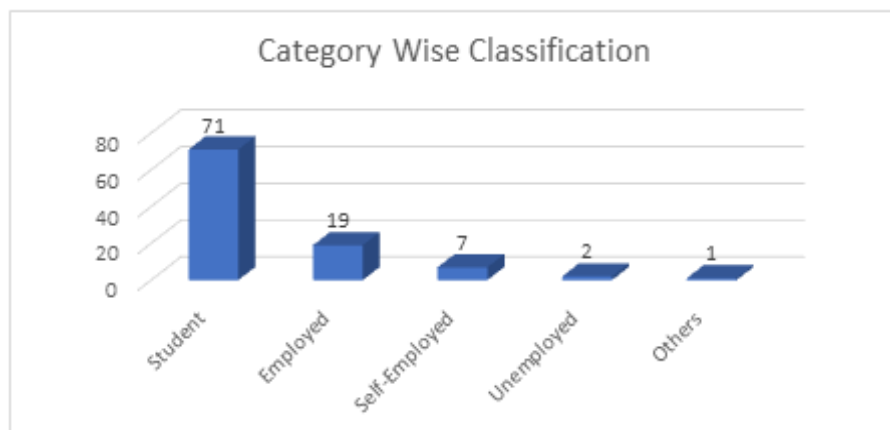
Table 2 shows that as per Gender Wise Classification, highest (65) were Female while the least (1) belonged to Others.

Category Wise Classification

Table 3

Category	Count
Student	71
Employed	19
Self-Employed	7
Unemployed	2
Others	1

Source: Primary Data

**Figure 4**

As per Table 3, the highest number of users belonged to student category while the least belonged to Other Category.

Education Wise Classification

Table 4

Education	Count
S.S.C.	1
H.S.C	8
Graduate	55
Post-Graduate	26
Professional Qualification	10

Source: Primary Data

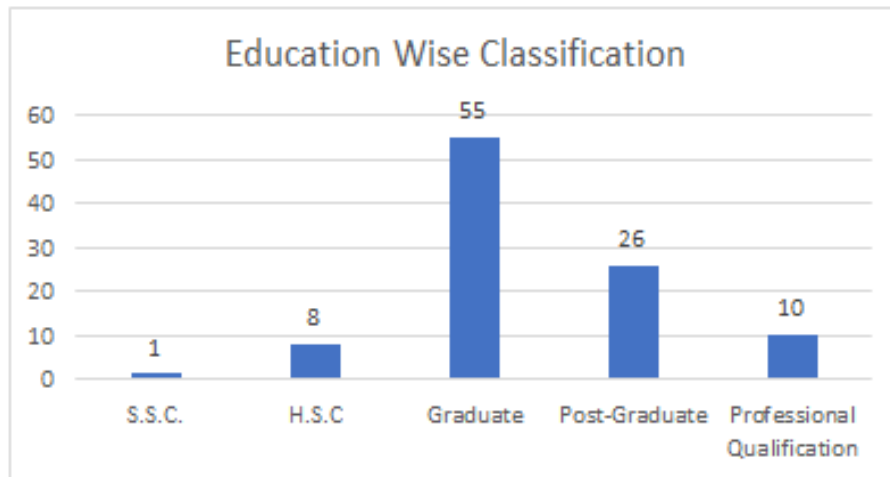


Figure 5

As per Table 4, Most users are graduates while the least number of users had S.S.C qualification.

Nature of Transactions

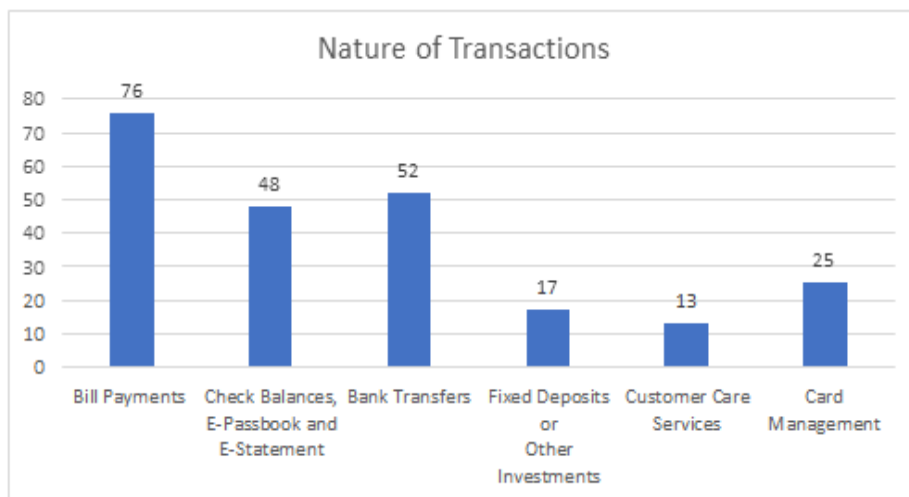


Figure 6

Figure 6 shows that the mobile banking applications are being mostly used for Bill Payments whereas it is least used for Customer Care Services.

ANALYSIS OF CHALLENGES FACED BY USERS OF MOBILE BANKING APPLICATIONS

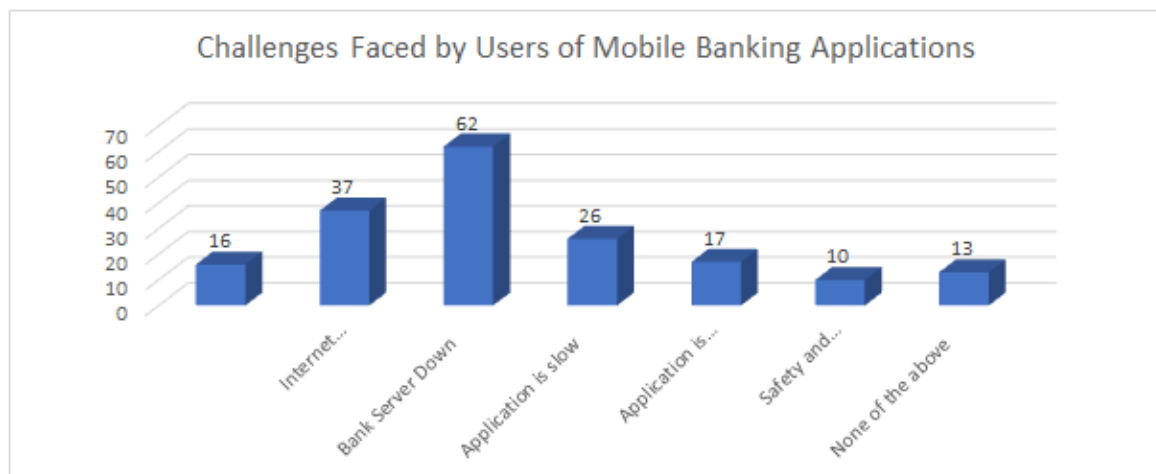


Figure 7

Figure 7 shows that most of the users of Mobile Banking Applications have faced Bank Server Issues while the problem which is faced the least is safety and security issues.

HYPOTHESIS TESTING

The Hypothesis has been tested by using the Chi-Square test of independence. The Chi-Square test of independence is a non-parametric hypothesis test. It is used to test whether two categorical variables are related to each other. Usage in the below tables have been coded as: 1= Never, 2= Rarely, 3= Sometimes, 4= Often, 5= Always.

The hypothesis has been tested below-

Hypothesis 1

H₀- There is no significant relationship between age and usage of mobile banking applications.

H₁. There is a significant relationship between age and usage of mobile banking applications.

Contingency Table

Select the appropriate age group you belong to	How often do you use Mobile Banking Applications					Total
	1	2	3	4	5	
0 – 20	3	8	11	4	9	35
21 – 40	1	5	15	16	23	60
41 – 60	0	0	1	0	1	2
61 – 80	0	1	1	0	1	3
Total	4	14	28	20	34	100

Source: Primary Data

Chi-Squared Tests

	Value	df	P
X ²	12.79	12	0.385
N	100		

The results of the above test indicate that the p value is 0.385 which is greater than 0.05. Therefore, we fail to reject H₀, which means that there is no significant relationship between age and usage of Mobile Banking Applications.

Hypothesis 2

H₀- There is no significant relationship between education and usage of mobile banking applications.

H₁. There is a significant relationship between education and usage of mobile banking applications.

Contingency Table

What is your education level?	How often do you use Mobile Banking Applications					Total
	1	2	3	4	5	
S.S.C.	0	0	1	0	0	1
H.S.C.	0	0	5	2	1	8
Graduate	3	10	13	11	18	55
Post-Graduate	1	2	8	6	9	26
Professional Qualification	0	2	1	1	6	10
Total	4	14	28	20	34	100

Source: Primary Data

Chi-Squared Tests

	Value	df	p
X ²	15.22	16	0.509
N	100		

The results of the above test indicate that the p value is 0.509 which is greater than 0.05. Therefore, we fail to reject H₀, which means that there is no significant relationship between education and usage of Mobile Banking Applications.

Hypothesis 3

H₀- There is no significant relationship between gender and usage of mobile banking applications.

H₁. There is a significant relationship between gender and usage of mobile banking applications.

Contingency Table

What is your Gender?	How often do you use Mobile Banking Applications?					Total
	1	2	3	4	5	
Female	3	10	21	15	16	65
Male	1	4	6	5	18	34
Other	0	0	1	0	0	1
Total	4	14	28	20	34	100

Source: Primary Data

Chi-Squared Tests

	Value	df	p
X²	10.73	8	0.218
N	100		

The results of the above test indicate that the p value is 0.218 which is greater than 0.05. Therefore, we fail to reject H₀, which means that there is no significant relationship between gender and usage of Mobile Banking Applications.

Hypothesis 4

H₀. There is no significant relationship between problems encountered and usage of mobile banking applications.

H₁. There is a significant relationship between problems encountered and usage of mobile banking applications.

Contingency Table

Have you ever faced problems while using Mobile Banking Applications?	How often do you use Mobile Banking Applications?					Total
	1	2	3	4	5	
Never	1	1	4	0	3	9
Rarely	1	10	10	7	11	39
Sometimes	2	2	12	7	16	39
Often	0	0	2	6	1	9
Always	0	1	0	0	3	4
Total	4	14	28	20	34	100

Source: Primary Data

Chi-Squared Tests

	Value	df	p
X²	28.77	16	0.026
N	100		

The results of the above test indicate that the p value is 0.026 which is lower than 0.05. Therefore, we reject H₀. This means that there is a significant relationship between problems encountered and usage of Mobile Banking Applications.

LIMITATIONS

This study was restricted to the users of Mobile Banking Applications in Ulhasnagar. The sample size was also limited. Thus, the results may be different for the users of Mobile Banking Applications in other cities and states.

CONCLUSION

This research was done with the intention of analysing the usage of Mobile Banking Applications by the customers in Ulhasnagar. The hypothesis testing results have revealed that there is a significant relationship between problems encountered and usage of Mobile Banking Applications. Further findings state that Mobile Banking Applications were mostly used by the population in the age group of 21-40. They are mainly used for transactions like making Bill Payments followed by Bank Transfers.

The problem which is most reported by the users is Bank Server Issues. Hence, there is a need to make improvements by the Banks so that customers do not have to face these issues while using Mobile Banking Applications.

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CONSUMERS PERCEPTION ON 10 MINUTES DELIVERY APPS TOWARDS QUICK COMMERCE (Q – COMMERCE)

¹Vijeta Rohra, ²Mehar Sharma and ³Vandana Kanojiya

^{1, 2, 3}Assistant Professor, R K Talreja's College of Arts, Science & Commerce (Centre for Management Courses), Ulhasnagar-421003

ABSTRACT

Q – Commerce is the new vogue in E – Commerce World. Where one gets desired products or Grocery within minutes at a place where an individual wants. In Q – Commerce widest range of apps provide delivery of products within minutes at your place. The main objectives of research paper was to study which app consumer use the most for 10 – minutes delivery apps, to know the benefits of the apps, to find out preferable mode by consumer and to find out future perspective of 10 minutes delivery apps. The researchers has used structured questionnaire for primary data collection. Convenience sampling method was used to collect data from 204 consumers. For data analysis, Percentage, Pie diagram and Bar chart are used by researchers. The Researcher at last concluded that Consumers still today make use of both methods of delivery i.e. Offline and Online as per there requirements. Consumers of E – World mostly prefers the 10 minutes delivery apps for their daily needs and they are very likely to continue with 10 minutes delivery apps for the future. Many Consumers prefers Zepto App at large for their needs at it gives offers and cashback to them. Consumer considers these 10 minutes delivery apps beneficial as it saves time and availability of the products at late night.

Key Words: Consumers, E – Commerce, E – World, Q – Commerce, 10 – Minutes Delivery apps.

INTRODUCTION

In a world, where everything is going in a Quick time, so why not consumer shopping of essentials in a just click should reach a consumer within minutes. The new member Q – Commerce in the E – World changed the consumer's world of essentials shopping in a blink of an eye. Q – Commerce use the concept of "I – need – it – now" for their business. Consumers has no need to go anywhere to shop, the products will come to consumer at the desired place. Consumers places an order on Q - commerce apps and delivery agent collects the products from the dark stores and reaches the consumers within minutes at a place. The Q – Commerce apps such as Flipkart minutes, Zepto, Blinkit, Swiggy Instamart, Big Basket and few other apps have come at door step of consumers for their needs. These app market has provided convenience to the consumers at any time of a day. Short story of few 10 minutes delivery apps is stated below:

TYPES OF 10 MINUTES DELIVERY APPS

- 1) **Flipkart Minutes:** It is owned by Walmart. Flipkart Minutes is a quick commerce service that offers fast delivery of groceries, electronics, and other products.
- 2) **Zepto:** It is owned by Aadit Palicha and Kaivalya Vohra. It is termed as one of the pioneers in 10 minutes delivery app market. It offers Zepto cash, coupons, refer and earn scheme.
- 3) **Blinkit:** It was formerly known as Grofers. It is acquired by Zomato. It streamlined on ultra-fast grocery and essentials delivery network.
- 4) **Swiggy Instamart:** It is operated by Swiggy. Swiggy Instamart reportedly processes over 1.5 million orders per month. It gives various offers, coupons and bank offers to the consumers.
- 5) **BigBasket:** It is owned by Tata Group. It introduced hyperlocal delivery hubs to compete in the ultra-fast delivery space.

Objective of the study

- 1) To find out which app consumer use the most for 10 – minutes delivery app.
- 2) To know the benefits of 10 – minutes delivery apps.
- 3) To find out which mode is preferable by consumers.
- 4) To analyze future perspective of 10 Minutes Delivery App from consumers view point.
- 5) To understand why consumer prefer for digital mode of delivery in comparison to traditional mode.

Methodology

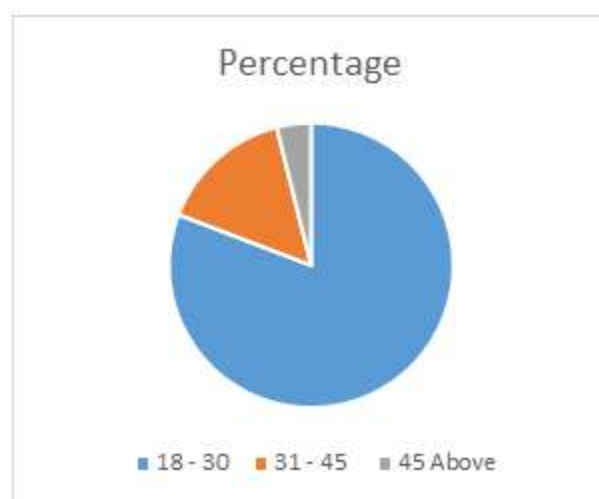
- 1) **Primary Data:** Data collection for research is done with the help of Structured Questionnaires through Google forms.
- 2) **Secondary Data:** It is collected from online sources such as websites, E-Research papers & E-Magazines.
- 3) **Sample Size:** The sample size has 204 consumer's respondent's opinion on Q – Commerce apps.

Limitations of the study

- 1) The study is limited upto Ulhasnagar.
- 2) The study is limited upto 204 consumers.
- 3) The study is limited upto few 10 minutes delivery apps.
- 4) The study only focus on 10 minutes delivery apps.
- 5) The survey is conducted through Google Forms, which excludes non – internet users.

❖ AGE

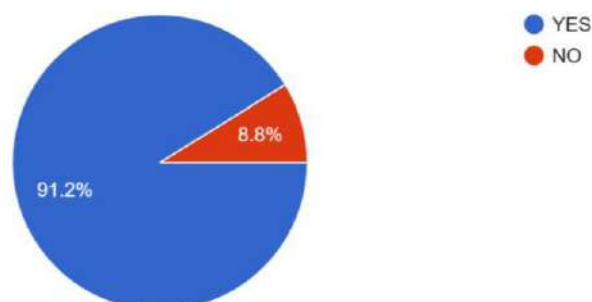
Age Group	No. of Responses	Percentage of Respondents
18 – 30	164	80.8 %
31 – 45	32	15.3 %
45 Above	8	3.9 %
Total	204	100



1) Do you use 10 Minute Delivery Apps for online shopping?

10 Minutes Delivery Apps	No. of Responses
YES	186
NO	18
Total	204

1) Do you use 10 Minute Delivery Apps for online shopping ?
204 responses



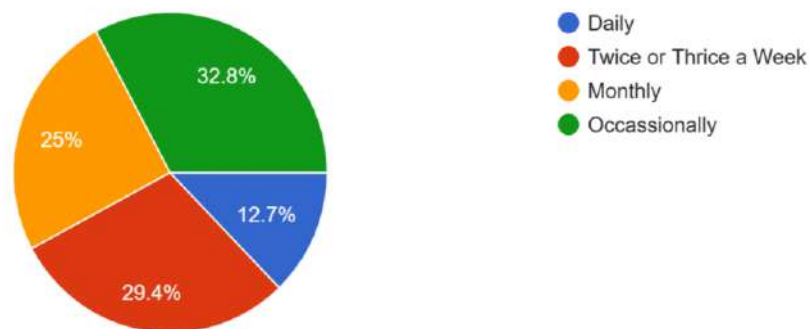
Interpretation: From the data it is being analysed that 91.2 % of the individuals use 10 Minutes Delivery Apps and 8.8 % do not use 10 minutes delivery apps for shopping.

2) How Frequently do you use 10 Minutes Apps?

10 Minutes Delivery Apps	No. of Responses
Daily	26
Twice or Thrice a Week	60
Monthly	51
Occasionally	67
Total	204

2) How Frequently do you use 10 Minutes Apps ?

204 responses



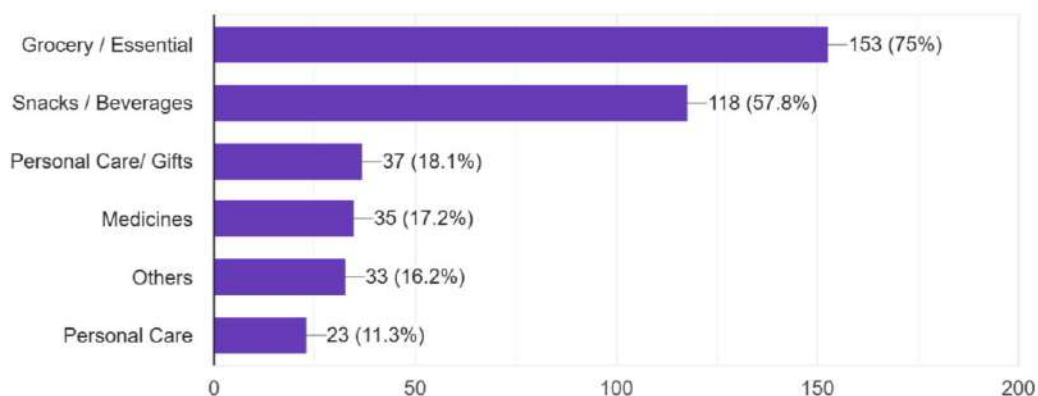
Interpretation: According to this pie chart , 12.7 % of the consumers use 10 minutes delivery apps daily, 29.4 % of the consumers use these apps twice or thrice a week , 25 % of the consumers use these apps monthly and 32.8 % consumers use these apps occasionally.

3) Which types of Product do you order via these apps?

10 Minutes Delivery Apps	No. of Responses
Grocery / Essential	153
Snacks / Beverages	118
Personal Care/ Gifts	37
Medicines	35
Others	33
Personal Care	23

3) Which types of Product do you order via these apps ?

204 responses



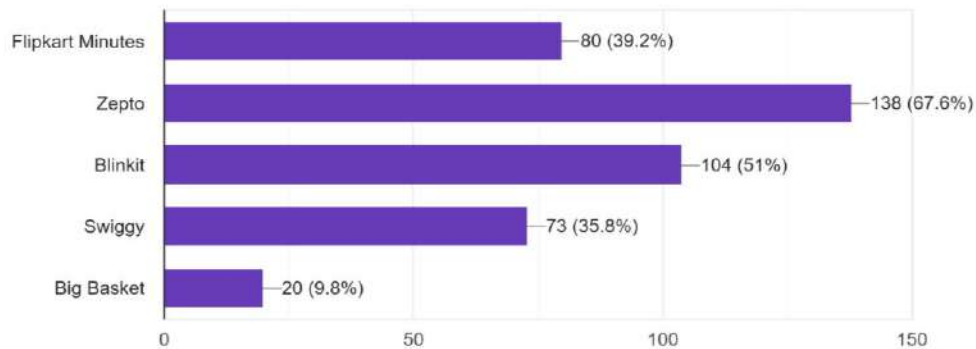
Interpretation: This graph shows that 75 % of the consumers order Grocery / Essential Products , 57.8 % of the consumers order Snacks or Beverages , 18.1 % of the consumers order Personal care or Gifts, While 17.2 % of the consumers order Medicines and 16.2 % of the consumers order other products.

4) Which 10 Minutes Delivery apps do you use the most?

10 Minutes Delivery Apps	No. of Responses
Flipkart Minutes	80
Zepto	138
Blinkit	104
Swiggy	73
Big Basket	20

4) Which 10 Minutes Delivery apps do you use the most ?

204 responses



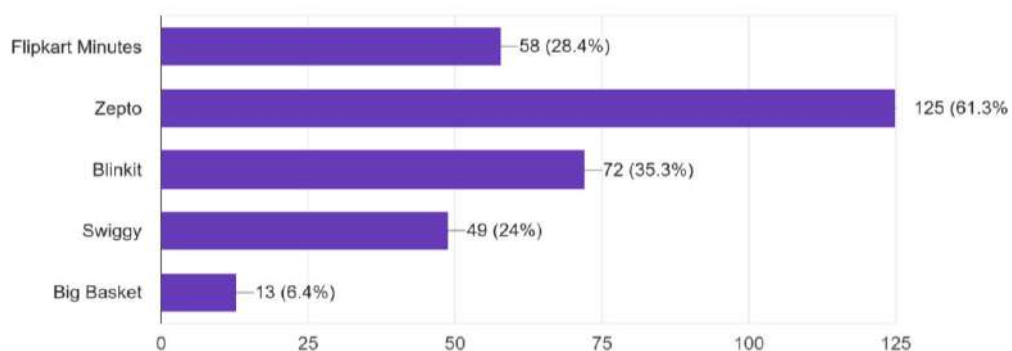
Interpretation: Above graph represents that 67.6 % of the consumers use Zepto app for shopping, 51 % of the consumers prefer Blinkit for shopping, 39.2 % of the consumers prefer Flipkart minutes, 35.8 % prefers Swiggy (Instamart) and only 9.8 % prefers Big basket app for 10 minutes app for shopping.

5) Which 10 minutes delivery apps gives you the more offer and cashback?

10 Minutes Delivery Apps	No. of Responses
Flipkart Minutes	58
Zepto	125
Blinkit	72
Swiggy	49
Big Basket	13

5) Which 10 minutes delivery apps gives you the more offer and cashback ?

204 responses



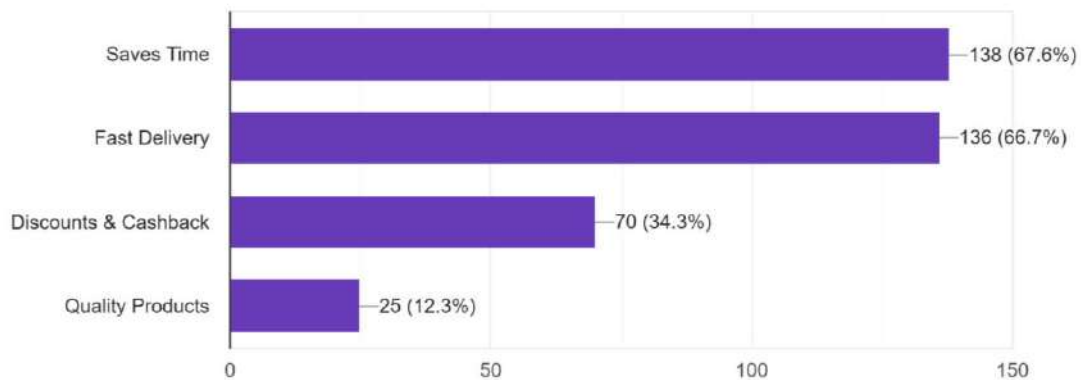
Interpretation: From the above data it is seen that 61.3 % of the consumers considers Zepto app provides more offers and cashback than other apps. Other apps provides comparatively less offers and cashback than Zepto.

6) Why do you Prefer to use 10 Minutes delivery apps?

10 Minutes Delivery Apps	No. of Responses
Saves Time	138
Fast Delivery	136
Discounts & Cashback	70
Quality Products	25

6) Why do you Prefer to use 10 Minutes delivery apps ?

204 responses



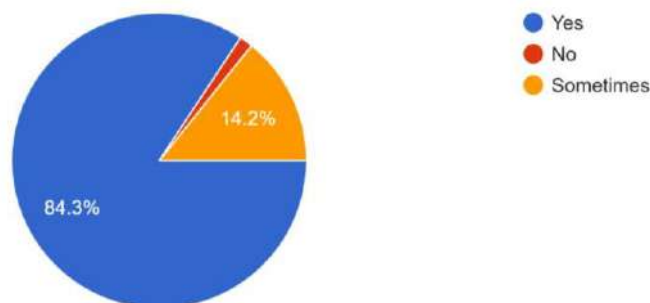
Interpretation: We can see that 67.6 % of the consumers prefers these apps as it saves time, 66.7 % prefers that these apps for shopping as it provides fast delivery, 34.3 % prefer these apps provide discounts & cashback while 12.3 % believes these apps gives quality products to them.

7) The Product you receive through these apps are in a good condition?

10 Minutes Delivery Apps	No. of Responses
Yes	172
No	3
Sometimes	29
Total	204

7) The Product you receive through these apps are in a good condition ?

204 responses



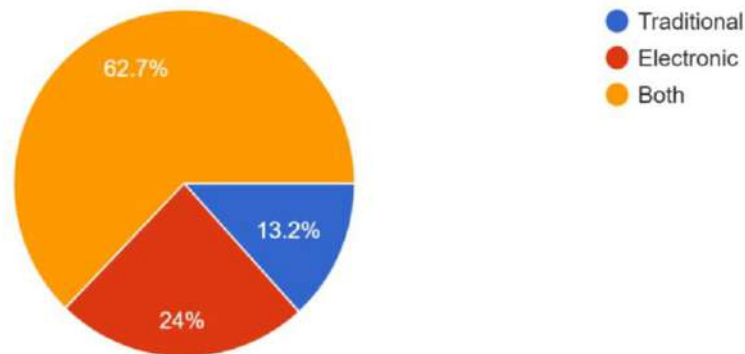
Interpretation: From the above pie chart, it is analysed that 84.3 % of the consumers receives product in a good condition while 1.5 % states that they don't receive the product in a good condition and 14.2 % state that they sometimes receives the product in a good condition.

8) Which mode as a consumer you prefer the most in today's time?

10 Minutes Delivery Apps	No. of Responses
Traditional	27
Electronic	49
Both	128
Total	204

8) Which mode as a consumer you prefer the most in today's time ?

204 responses



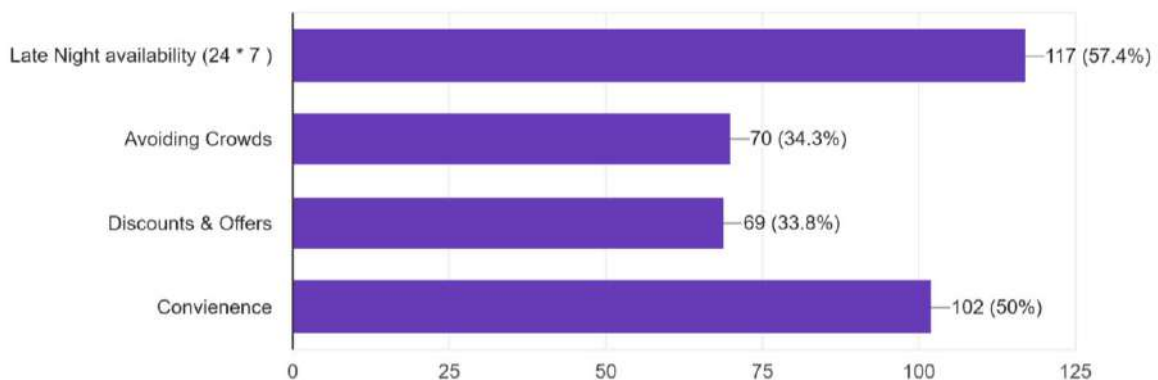
Interpretation: According to this pie chart, 62.7 % of the consumer use online and offline mode of shopping for their needs, 24 % only prefers electronic mode for shopping and 13.2 % still prefers the old way of shopping i.e. traditional.

9) What is the reason you opt for 10 Minute Delivery apps over traditional shopping?

10 Minutes Delivery Apps	No. of Responses
Late Night availability (24 * 7)	117
Avoiding Crowds	70
Discounts & Offers	69
Convenience	102

9) What is the reason you opt for 10 Minute Delivery apps over traditional shopping ?

204 responses

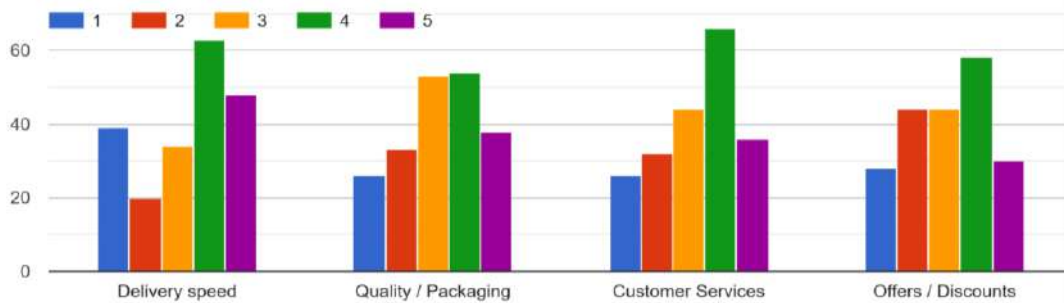


Interpretation: The above graph represents that 57.4 % of the consumer prefer 10 minutes delivery apps over traditional as products are available late night (24 * 7), 50 % states that these apps are convenient than traditional shopping, while 34.3 % and 33.8 % prefer 10 minutes delivery apps over traditional shopping as it avoids crowds and provides discount and offers.

10) What is Your Satisfaction Level with these apps?

10 Minutes Delivery Apps	No. of Responses			
Rating Scale	Delivery speed	Quality / Packaging	Customer Services	Offers / Discounts
1	39	26	26	28
2	20	33	32	44
3	34	53	44	44
4	63	54	66	58
5	48	38	36	30

10) What is Your Satisfaction Level with these apps?

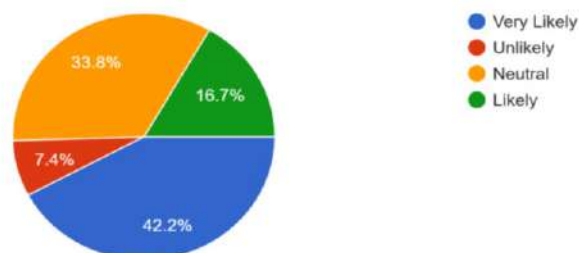


Interpretation: The above graph indicates different satisfaction level of the consumers in relation to the Delivery or speed, Quality or Packaging, Customer Services and Offers or Discounts of these 10 minutes delivery apps.

11) How likely are you to continue using 10 - Minutes Shopping delivery apps in the future?

10 Minutes Delivery Apps	No. of Responses
Very Likely	86
Unlikely	15
Neutral	69
Likely	34
Total	204

11) How likely are you to continue using 10 - Minutes Shopping delivery apps in the future ?
204 responses

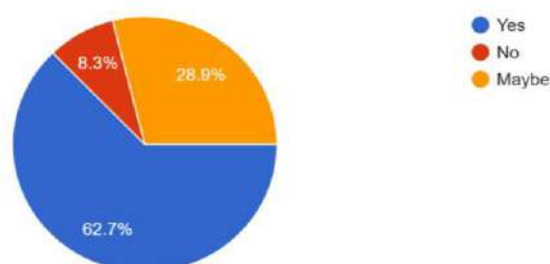


Interpretation: The above chart states that 42.2 % of the consumers are very likely to continue these apps for shopping, 7.4 % are unlikely to continue these apps in future, 16.7% are likely to continue these apps in future while 33.8 % are neutral for these apps.

12) Do you believe 10 minute delivery apps is sustainable for the long term?

10 Minutes Delivery Apps	No. of Responses
Yes	128
No	17
Maybe	59
Total	204

12) Do you believe 10 minute delivery apps is sustainable for the long term ?
204 responses



Interpretation: From the above data, it is analysed that 62.7 % consider that 10 minutes delivery apps are sustainable for long term , while 8.3 % do not consider they are sustainable for long term and 28.9 % are unsure about their sustainability.

CONCLUSION

In a world of digitalization where every market has modified themselves from the traditional to digital mode. As likely Grocery or Essential Product market also entered into E – Commerce as the Q – Commerce to gain its position. Consumer of today is very likely prefer this Q – Commerce platform for their daily needs as they believe that these 10 minutes delivery apps provides huge offers and discounts , provides them goods or products at door step within minutes even at late night. From among the different Q – Commerce app – Zepto is one of the most liked app of the consumer for their daily needs. Consumers of E – World are very likely to continue their shopping with these apps for future. It is stated that “Q – Commerce is the next step in the evolution of Ecommerce and as the name suggests it’s all about speed.

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**IMPACT OF SOCIAL MEDIA AND ONLINE BOOKING PLATFORMS ON TOURIST
MOTIVATION AND SATISFACTION IN RURAL TOURISM**

¹Ms. Vindiya.chettiar, ²Ms.Preeti Gupta, ³Ms. Sanjana Sanju, ⁴Ms. Riddhi Gupta and ⁵Mr.Niraj Kumar Mishra

^{1, 2, 3, 4}Seva Sadan College of art science and commerce

⁵Research Scholar, United World of Management Karnavati University, Gandhi Nagar, Gujarat

ABSTRACT

This study examines the impact of social media and online booking platforms on tourist motivation and satisfaction in rural tourism. With the rapid growth of digital technology, platforms such as Instagram, Facebook, YouTube, and online travel websites have significantly influenced travel decisions. Social media exposes tourists to attractive images, reviews, and experiences shared by other travelers, which increases curiosity and motivation to explore rural destinations. Online booking platforms provide convenience, transparency in pricing, and easy access to accommodation and activity options, reducing uncertainty and encouraging travel planning.

INTRODUCTION

In recent years, rural tourism has emerged as an important segment of the tourism industry, offering travelers authentic cultural experiences, natural landscapes, traditional lifestyles, and peaceful environments away from urban life. At the same time, the rapid growth of social media and online booking platforms has significantly transformed the way tourists discover, plan, and experience travel. Social media platforms such as Instagram, Facebook, YouTube, and travel blogs play a crucial role in influencing tourist motivation.

OBJECTIVE OF THE STUDY

1. To examine the influence of social media on tourists' motivation to visit rural tourism destinations.
2. To analyze the role of online booking platforms in shaping tourists' decision-making process.
3. To evaluate how digital reviews, ratings, and online content affect tourist expectations and satisfaction.
4. To study the relationship between online information availability and overall tourist experience in rural areas.

SCOPE OF THE STUDY

The present study focuses on examining the impact of social media and online booking platforms on tourist motivation and satisfaction in rural tourism destinations. The scope of the study includes:

1. Geographical Scope

The study is limited to selected rural tourism destinations (specify region/district/state if needed). It does not cover urban tourism areas

2. Conceptual Scope

The research mainly concentrates on: The role of social media platforms (such as Instagram, Facebook, YouTube, travel blogs, etc.) in influencing tourist motivation. The influence of online booking platforms (such as Booking.com, Airbnb, MakeMyTrip, etc.) on tourists' travel decisions. The relationship between digital platforms usage and overall tourist satisfaction in rural tourism.

3. Exclusions

The study does not focus on:

Urban tourism.

Offline booking systems.

Government policy analysis in detail

REVIEW OF LITERATURE

Recent studies indicate that social media and online booking platforms play a significant role in shaping tourist motivation and overall satisfaction in rural tourism contexts. Social media platforms such as Instagram, Facebook, and travel blogs have become powerful tools for inspiring potential visitors by showcasing visual narratives of rural destinations, emphasizing authenticity, local culture, and unique experiences that traditional marketing often overlooks.

RESEARCH METHODOLOGY

To investigate the impact of social media and online booking platforms on tourist motivation and satisfaction in rural tourism, this study will adopt a mixed-methods research approach, combining both quantitative and qualitative techniques to gather comprehensive data. Quantitative data will be collected through structured questionnaires distributed to tourists who have recently visited rural destinations, focusing on their social media usage, booking behaviors, motivations for travel, and satisfaction levels.

DATA ANALYSIS AND INTERPRETATION**1. Role of Online Booking Platforms in Travel Planning**

Majority of respondents prefer booking accommodations through platforms like Booking.com, Airbnb, MakeMyTrip, etc.

Easy price comparison and customer reviews influence booking decisions.

Online booking platforms save time and increase convenience.

Interpretation:

Online booking platforms increase tourists' confidence and convenience, making rural tourism more accessible and organized.

2. Relationship Between Social Media Exposure and Tourist Satisfaction

Tourists who had realistic expectations (based on online content) reported higher satisfaction.

Over-edited or exaggerated social media content sometimes leads to disappointment.

Interpretation:

Authentic and accurate digital content leads to better satisfaction, while misleading content may reduce overall experience satisfaction.

3. Overall Satisfaction with Rural Tourism Experience

Majority of respondents expressed satisfaction with rural tourism experiences.

Key satisfaction factors: local culture, hospitality, natural environment, and peaceful Atmosphere.

Digital platforms helped in better planning, leading to smoother experiences.

Interpretation:

Social media and online booking platforms positively influence both motivation and Satisfaction, but authenticity and transparency are essential for long-term success.

Data Sources:**1. Primary Data Sources**

(Collected directly by the researcher)

Structured Questionnaires – Survey forms distributed to tourists visiting rural destinations to collect data on their motivation, booking behavior, and satisfaction levels.

Online Surveys (Google Forms, etc.) – Shared through social media platforms to gather Responses from tourists who used online booking platforms.

2. Secondary Data Sources

(Already published information)

Research Articles & Journals – Published studies related to rural tourism, social media Marketing, and online booking systems.

Books & E-books – Academic books on tourism management and digital marketing.

Government Reports – Tourism department reports, rural tourism development reports.

Sample Design:

The study will target approximately 100–150 respondents, including both male and female tourists from different age groups. The respondents will be selected based on the following Criteria:

They must have visited at least one rural tourism destination.

They must have used social media (such as Instagram, Facebook, YouTube, etc.) for travel Information.

They must have used online booking platforms (such as Booking.com, MakeMyTrip, Airbnb, Etc.) for reservations.

Tools and Techniques:

Structured Questionnaire

To collect primary data from tourists.

Includes questions about social media usage, booking platform experience, motivation, and Satisfaction levels.

Google Forms / Online Survey Tools

Used to distribute questionnaires digitally.

Easy data collection and automatic response recording.

Interview Schedule

Short interviews with tourists or rural tourism operators.

Helps in gathering detailed opinions and real experiences.

Secondary Data Sources

Research articles, journals, tourism reports, government websites.

HYPOTHESES**Main Hypotheses**

H1: Social media significantly influences tourists' motivation to visit rural destinations.

H2: Online booking platforms positively affect tourists' satisfaction in rural tourism.

H3: Ease of use of online booking platforms increases tourist satisfaction in rural Destinations.

H4: Online reviews and ratings on booking platforms significantly impact tourists' decision making for rural tourism.

FINDINGS OF THE STUDY

Social Media Significantly Influences Tourist Motivation

Most tourists reported that social media platforms like Instagram, Facebook, and travel blogs increased their interest in visiting rural destinations.

Visual content (photos, videos, reels) showcasing natural landscapes, local culture, and unique experiences was the strongest motivator.

CONCLUSION

The study concludes that social media and online booking platforms have a significant impact on tourist motivation and satisfaction in rural tourism. Social media platforms such as Instagram, Facebook, and YouTube play an important role in influencing tourists by providing attractive visuals, reviews, travel stories, and recommendations. These digital platforms create awareness about rural destinations, shape perceptions, and inspire tourists to explore less-known areas. Online booking platforms further enhance the travel experience by offering convenience, transparency, price comparisons, and customer reviews. Easy access to information, secure payment options, and instant booking facilities increase tourists' confidence and reduce uncertainty while planning rural trips. As a result, tourists feel more satisfied due to smooth planning and better service expectations.

SUGGESTIONS**General Research Topics**

The Role of Social Media in Influencing Tourist Motivation towards Rural Destinations

Impact of Online Booking Platforms on Tourist Satisfaction in Rural Tourism

Digital Platforms as Drivers of Rural Tourism Growth

Influence of Instagram and Travel Blogs on Rural Travel Decisions

Effect of Online Reviews on Tourist Satisfaction in Rural Areas

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Galiano, A., & Blanco-Moreno, S. (2025). Exploring Rural Tourism Experiences from Social Marketing and Happiness Management Perspective: A Survival Analysis with Instagram. *Revista Empresa y Humanismo*.

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Azhar, M., Husain, R., Hamid, S., & Rahman, M. N. (2023). Effect of Social Media Marketing on Online Travel Purchase Behavior Post-COVID-19: Mediating Role of Brand Trust and Brand Loyalty.

3. Tourist Satisfaction & Rural Tourism

Zhou, X., Wang, Y., & Ma, P. (2022). Survey on the Tourist Satisfaction of Rural Homestay Based on the Theory of Importance-Performance Analysis. *Frontiers in Psychology*. This Article provides insight into satisfaction factors specifically for rural homestays, which you Can link with digital information or booking platforms.

Online Rural Destination Images: Tourism and Rurality. *Journal of Destination Marketing & Management* (2014). Though older, this research explores how online representations Influence expectations and satisfaction with rural destinations — a useful citation for Destination image aspects.

4. Broader Digital Tourism & Motivation Studies (Useful Theoretical Support)

Motivations for Sharing Tourism Experiences through Social Media. *Tourism Management* (2014). Classic paper on how motivations such as sharing experiences and social reasons Influence social media use in tourism.

Tourism in the Age of TikTok and Instagram: How Social Media Has Transformed Vacations. *Le Monde* (2025) — useful for a real-world context showing how social media shapes travel Trends and motivation.

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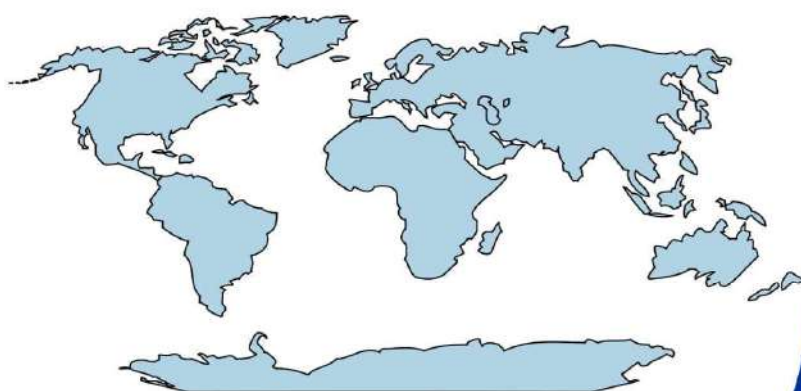
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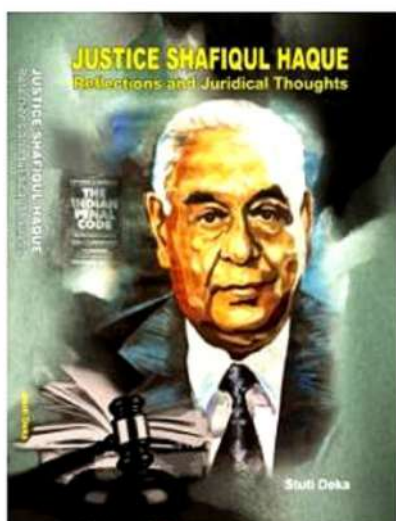


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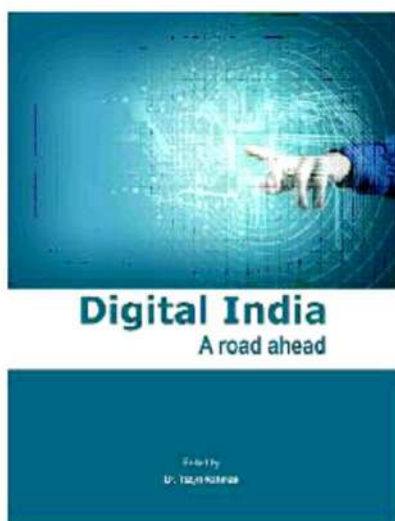
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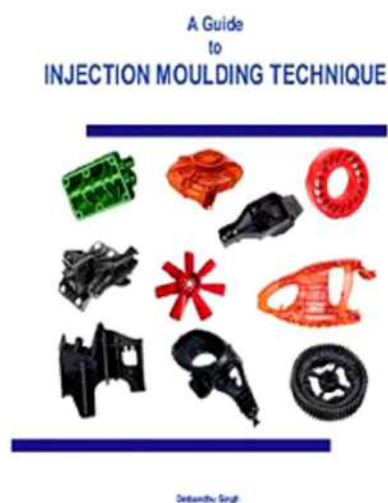
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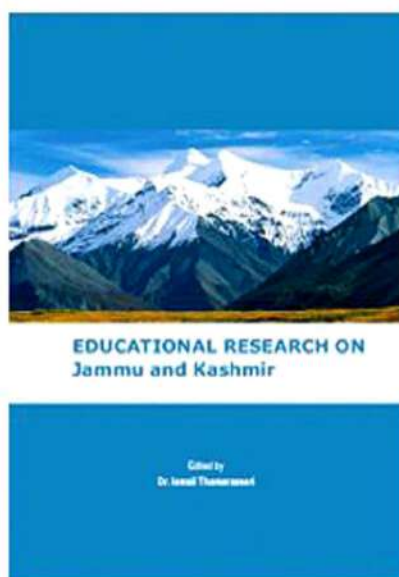
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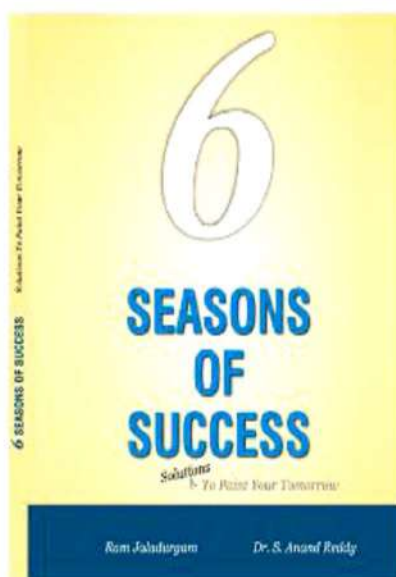
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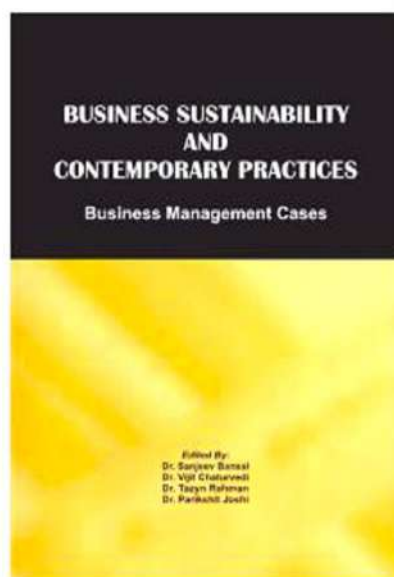
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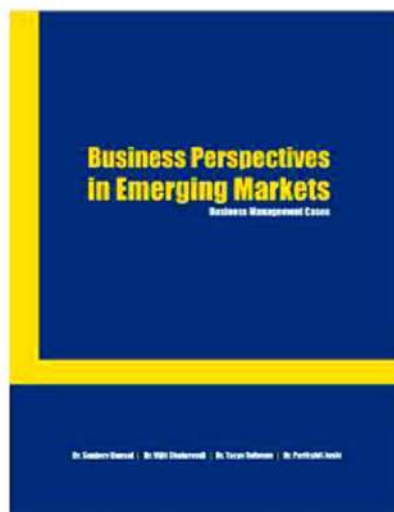
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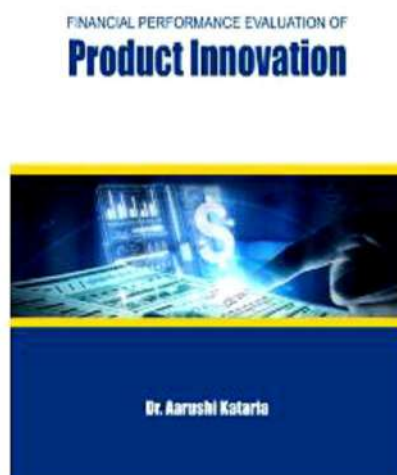
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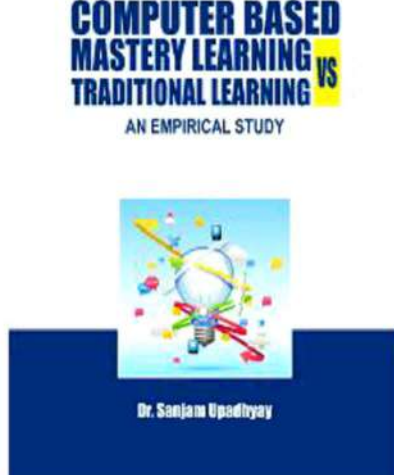
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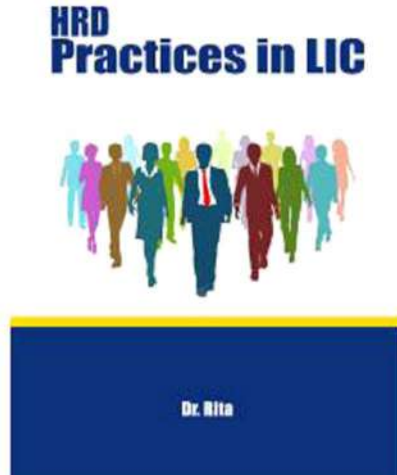
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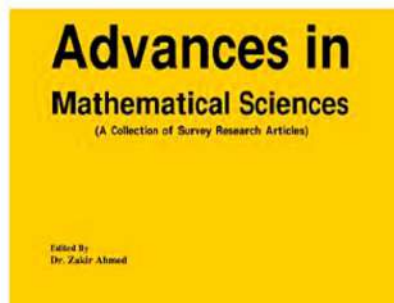
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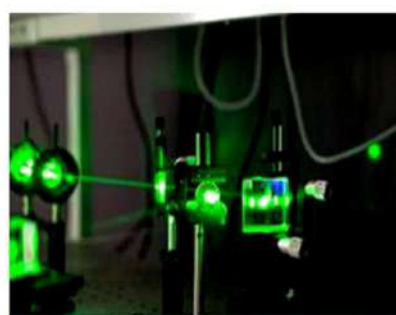


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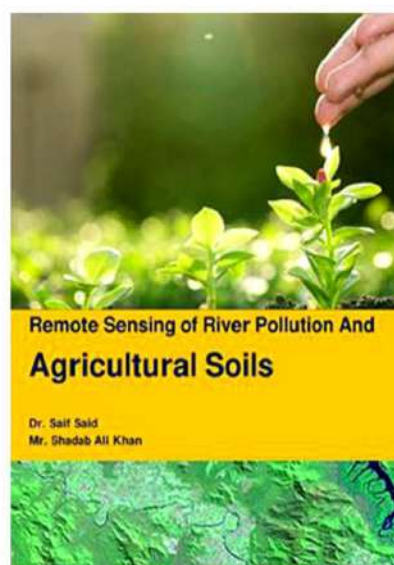
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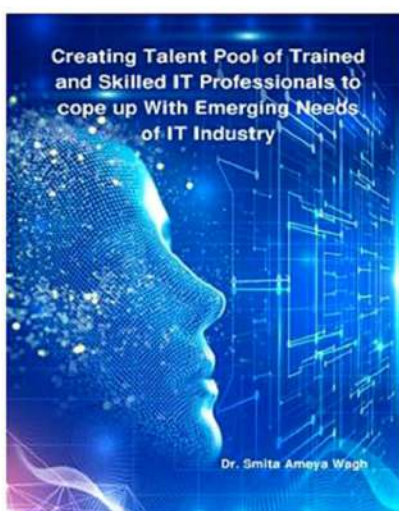
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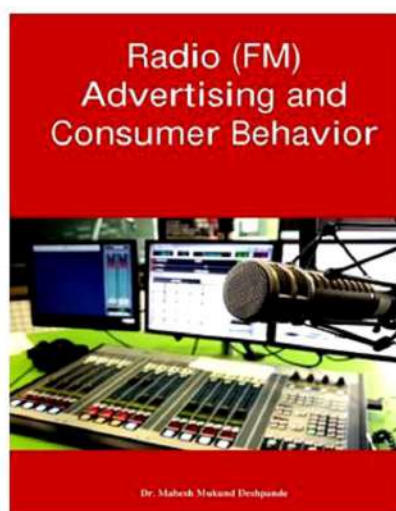
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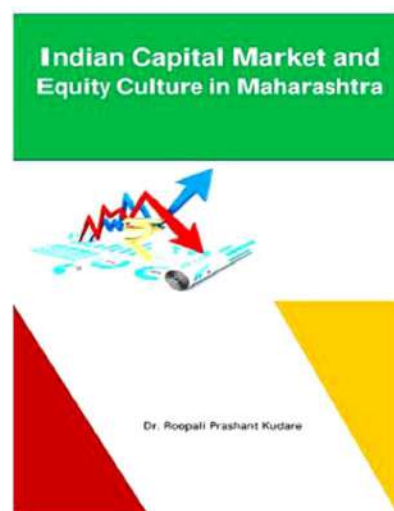
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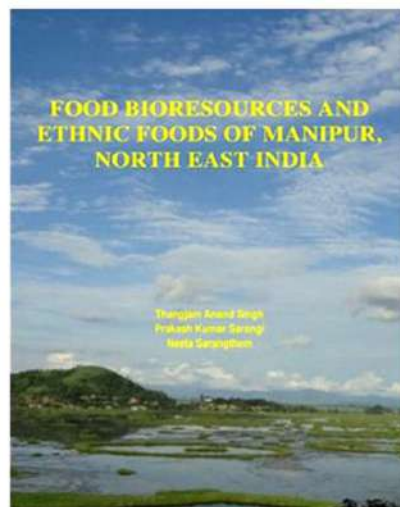
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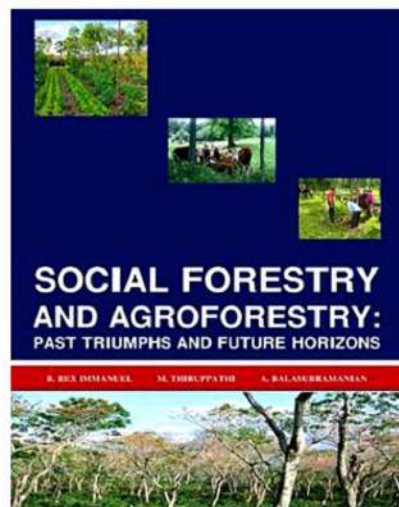
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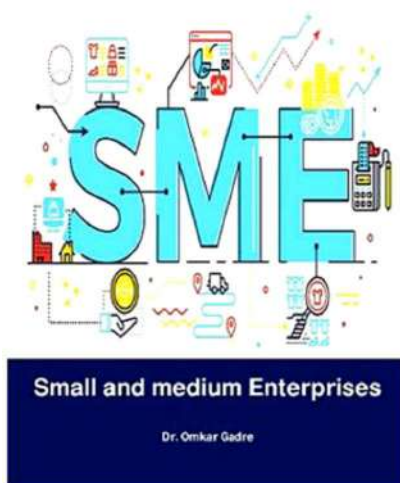
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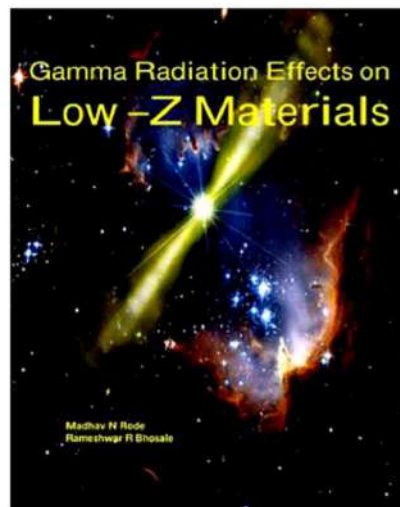
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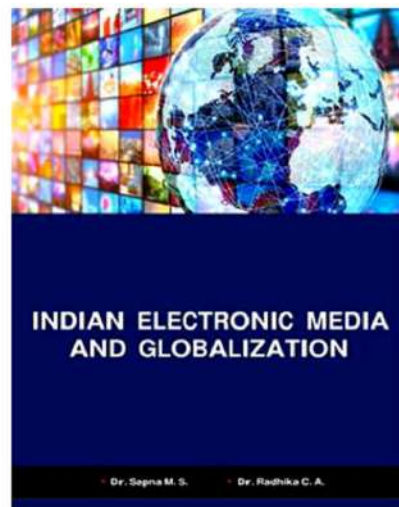
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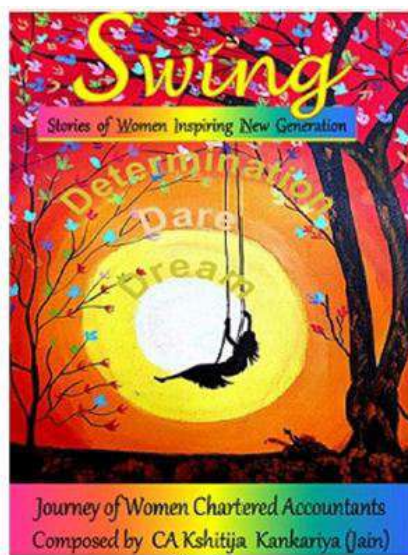
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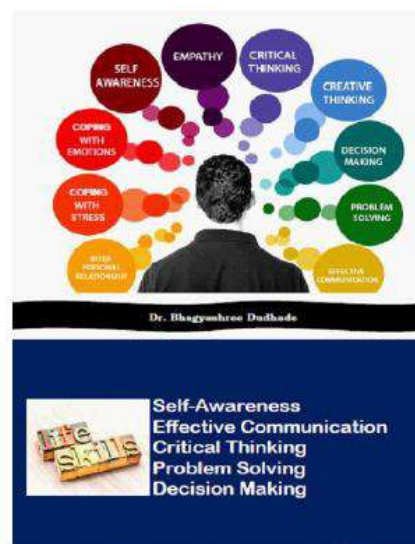
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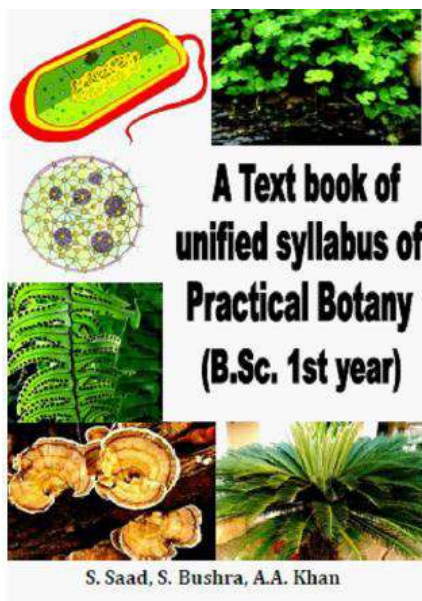
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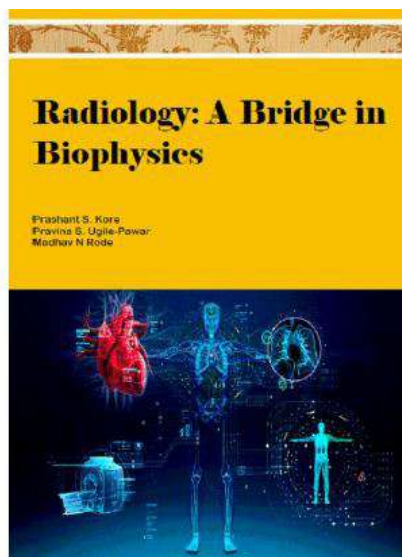


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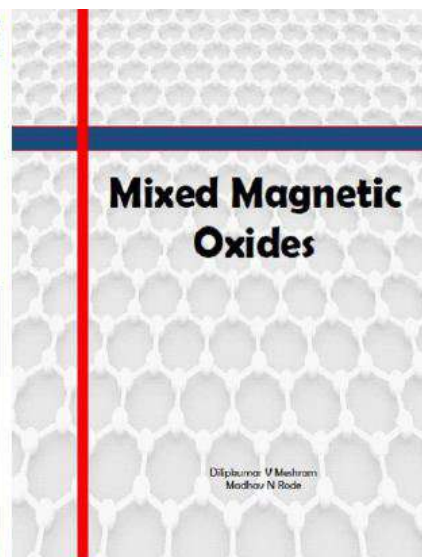
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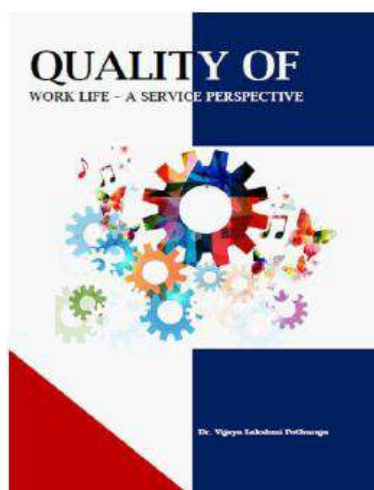
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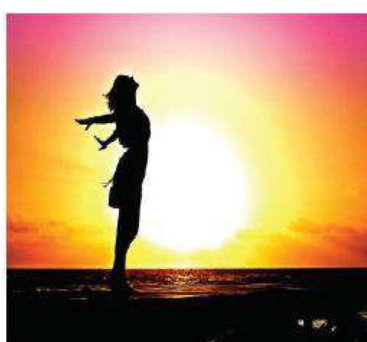
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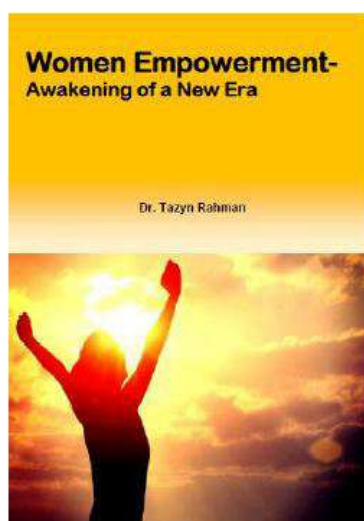
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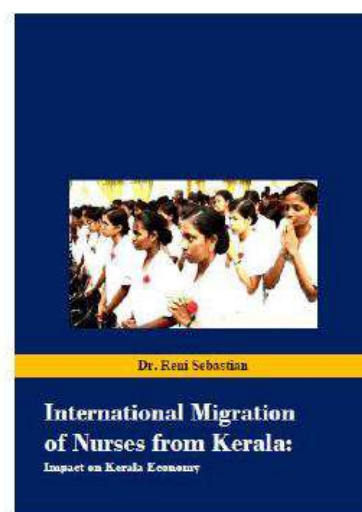
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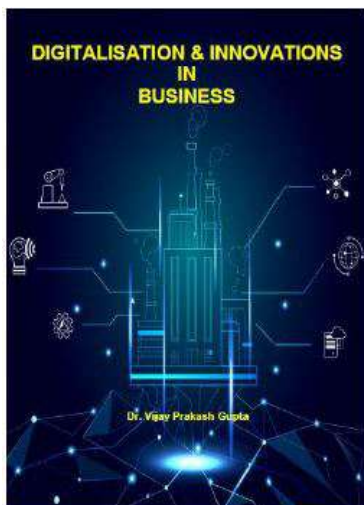
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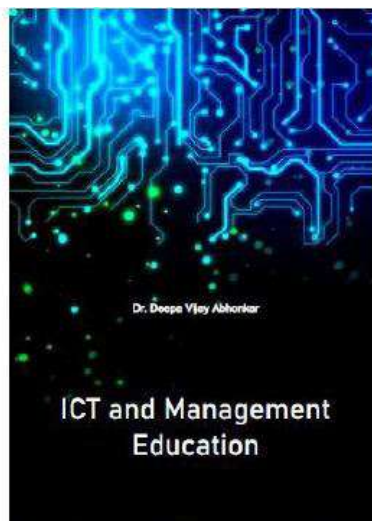
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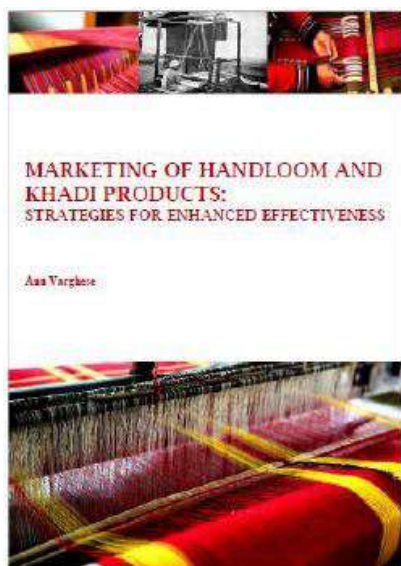
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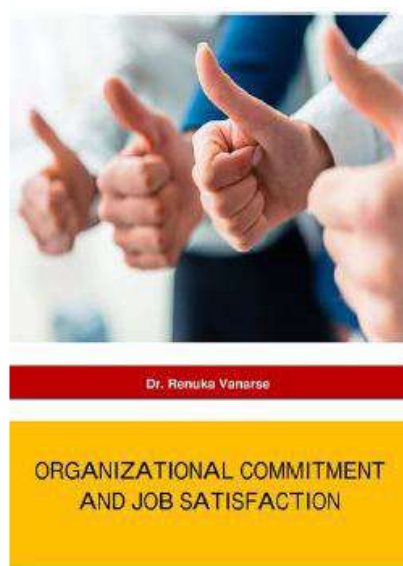
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